MARINE REVIEW

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DECISION IN ALAMEDA INSPECTION CASE

Capt. John Burmingham, supervising inspector of hulls and boilers, with headquarters in San Francisco, Cal., has just rendered an important decision in regard to the authority of the local inspectors. Burmingham decided that the local inspectors have authority to investigate negligence of pilots whether they have United States pilot license, or those issued by the state Board of Pilot Commissioners.

Local inspectors O. F. Bolles and J. K. Bulger, requested a decision in the matter to determine the legality of their investigations of the stranding of the steamship Alameda, and the case of Pilot Johnson, who was in charge of the vessel at the time of the grounding at Fort Point. The decision was as follows:

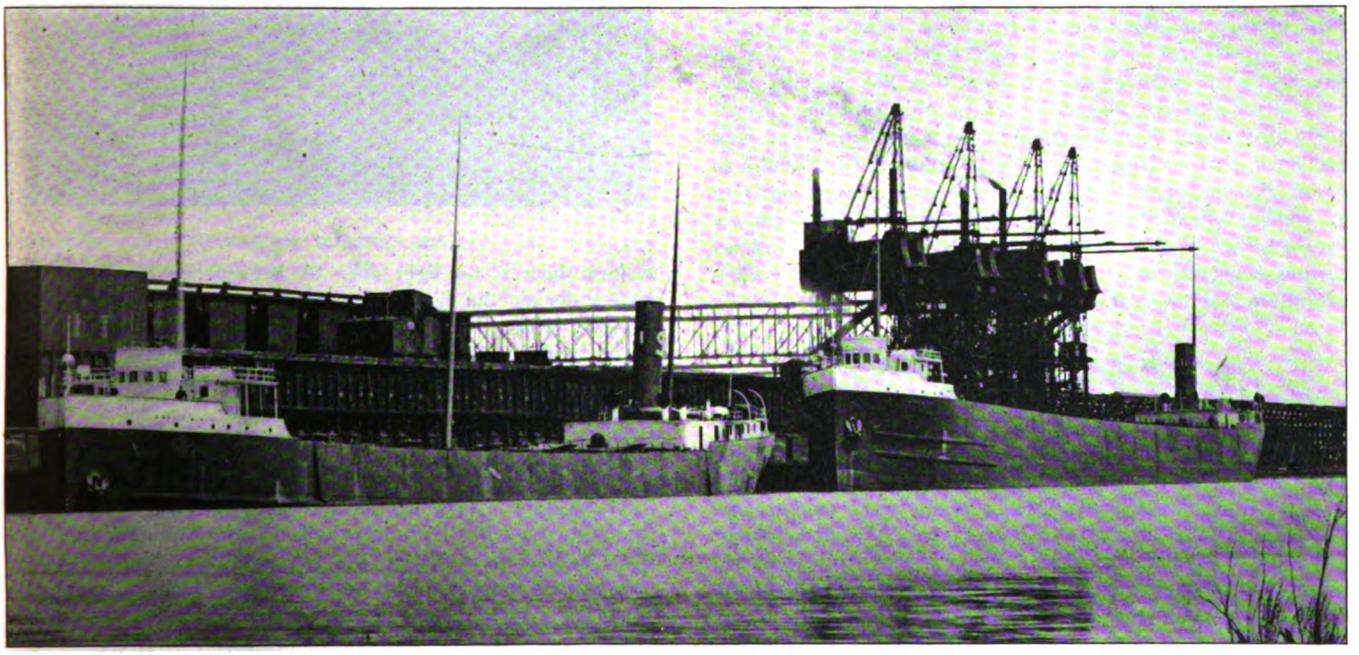
"If you have good reason to believe that a United States licensed pilot has either negligently or unskillfully navigated a vessel, whether under register or enrollment, as to cause her stranding or wreck, the case should be investgated by you under Section 4450 United States Revised Statutes, and your decision rendered thereon regardless as to whether such officer holds a state license or not."

A MOST IMPORTANT AID TO NAVIGATION

One of the most important aids to navigation and commerce that has been established for years on the Pacific coast, is the construction of the light station on the famous Mile Rock. This station has just been completed at a cost to the government of $100,000.

Mile Rock stands ⅜ of a mile from the eastern shore of the entrance to Golden Gate, San Francisco harbor, and just one mile eastward from a line drawn from North Head across to the Cliff House beach. For more than a half century, Mile Rock has been a constant menace to all shipping entering or departing from San Francisco bay.

The Government was for many years in a quandary as to what course to pursue. The rock was too large to blow up, and engineers declared it could never be beaconed—at least safely. But finally the Government determined to place a third order light station on the mere pinnacle of a rock, cost what it might. Owing to the great difficulties



THE STEINBRENNER STEAMER ANNA C MINCH AND PHILIP MINCH LYING AT THE COAL DOCK AT FT. WILLIAM.

and dangers to be encountered, a very liberal appropriation was made—sufficient to cover all expenditures. For more than a year has the work been prosecuted under great obstacles.

At mean ocean level, the ragged points of Mile Rock jutted only just 16 ft. above the ever piling, heaving waters. At very high tides, the point was almost entirely submerged. To work under such conditions was very perilous. Naturally the operations progressed very slowly. All the materials were conveyed to the rock on a little steam tender, and landed with much difficulty and danger, by means of spar derricks.

The foundation is composed of a huge steel cylinder 42 ft. high. The cylinder was built of steel plates each 2 ft. and 10 in. wide, and ¾ in. thick. These were strongly riveted together—boiler plate fashion. Then all the inside space was filled with cement. More than 1,200 barrels of cement were required to form the foundation. Sixty tons of steel plates were used in the foundation. The foundation is not perfectly round, but elliptical in shape; it is 40 ft. long, and 25 ft. across in the widest place. The huge cylinder was fitted over and around the top of the ragged rock, and being filled with cement, everything has become one solid massive stone pillar. Above the foundation the tower rises 50 ft., thus making the distance from ocean level to the crest 92 ft. The lens lantern is 12 ft. high, and 10 ft. in diameter. It is estimated that the light will be visible under fair conditions about 9 miles.

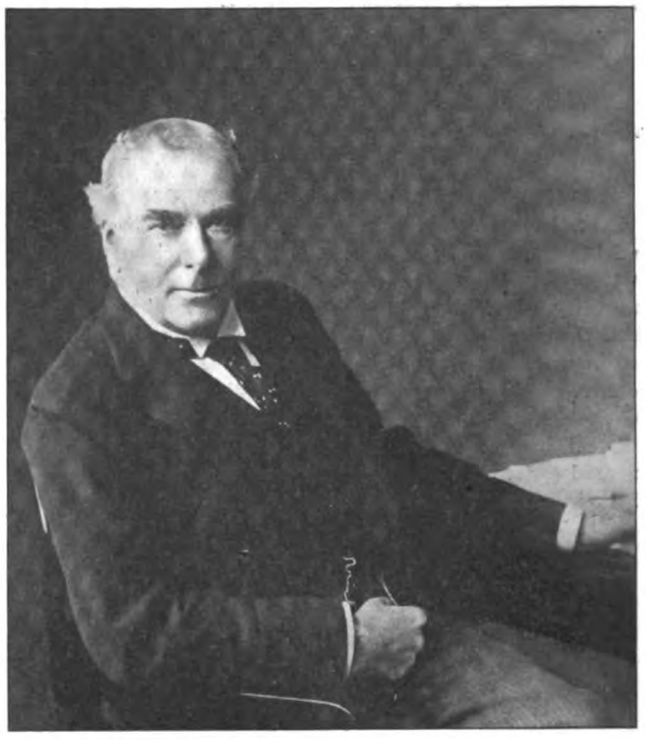
The upper part of the tower required 92 tons of steel. Connected with the station is a fog whistle that may be heard for several miles. It is operated by compressed air. Two keepers are required to take care of this most important station. Communication is maintained with the shore by means of a cable telephone.

Mile Rock station stands in the full sweep of the ocean's fury, of the tremendous gales that blow from all points of the compass, and of very powerful tidal currents. Yet so strongly is it anchored to the rock that the building may bid defiance to the united forces of old Neptune. Engineers pronounce it impregnable. So very dangerous was the work, that no landsman could be found hardy enough to undertake the perilous task. It was built almost entirely by sailors, under the personal supervision of the contractor's engineers. Strange to say no lives were lost and no serious accidents are to be recorded during all the work—extending over a year.

NEW CUNARD CHAIRMAN

Although many shipping men in Britain really believed that the present Lord Inverclyde would be called upon to succeed his deceased brother as chairman of the Cunard Steamship Co., the election of the deputy chairman, Mr. William Watson to that office, has occasioned neither surprise nor disappointment. Rather does the appointment seem to find popular favor and approbation, and rightly so, for no one can be said to have a more intimate knowledge of the Cunard company's affairs, and at the same time truly understand the delicate position the Cunard line finds itself in today, by reason of the recent fight with the combine and German lines, and also the understanding with the British government regarding the building of the two leviathan 25-knot turbine steamers. Further, Mr. Watson's election is popular because he is a Liverpool man, and being on the spot as it were, is in daily touch with the Cunard management.

Mr. Watson has now no connection whatever with the cotton-broking firm of Messrs. William Watson & Co., of which he was senior partner. In 1902, when elected deputy chairman of the Cunard company, he relinquished his connection with that firm in order to devote all his best energies to the welfare of the Cunard undertaking, and few will dispute the fact that he has done so consistently and well. His colleagues bear witness to that by electing him their chief, and it may thereby be assumed that the policy of the board under the late chairman, which had the hearty support of Mr. Watson, will be continued under his chairmanship. The Cunard company may yet have rough times to encounter. The severe competition in the Atlantic trade and the break-up of the North Atlantic conference, may beget trouble other than rate war. But in any eventuality that may arise, even under the sad circumstance that the late Lord Inverclyde is no more, to guide the fortunes of the company, there is confidence felt that the new chairman and his colleagues on the board will do the right thing for the future welfare of the company. Nevertheless, the task



MR. WILLIAM WATSON.

before them is no light one. A bold policy has been initiated during the last two or three years, which must be pursued with all its responsibilities and possibilities of ultimate success. The blue ribbon of the Atlantic must once more be in the possession of a British company, and that company the Cunard line.

METHOD OF TRIAL OF WAR VESSELS

Washington, Nov. 14.—Secretary of the Navy Bonaparte has approved the recommendation of Engineer-in-Chief Rae, to the effect that in the future the standardized screw method be employed for test purposes during the official trials of United States naval vessels, built under contract. The secretary holds that under the terms of the contracts with shipbuilders, the navy department has the right to specify the method of trial of war vessels prior to their acceptance, and inasmuch as the chief of the bureau of steam engineering is emphatically in favor of the standardized screw method, declaring it the most accurate, the head of the department concurs. Evidently some protests are anticipated from the shipbuilding firms that will be affected, for in making the above announcement the secretary of the navy made the supplementary statement that if any contractors feel that they have been unfairly treated, their relief must be obtained from Congress.

CARGO SAMPLING OF IRON ORES*

By W. J Rattle & Son.

Up to the time of the installation of the clamshell, the sampling of boats was not such a difficult proposition—as at that time, boats were unloaded by shoveling the ore into buckets—the shovelers working down through the ore in the center of each hatch, to the floor, and then working out, naturally gave good faces of ore to sample. With the slowness of unloading, the sampler found better walls of ore to sample and could take more time.

The method of unloading at present varies at nearly every dock—and consequently the method of procuring sample varies accordingly—for example, at the Erie docks, Cleveland, where they have three clamshells the boats are clamped out until bottom is reached in all hatches, then the boat is shifted to the Brown bucket machines, and unloading finished by hand. In this case, we aim to sample the ore when the boat has left the clams.

By the term "Lake Erie Ports" we mean all the docks from Detroit, Mich., to Tonawanda, N. Y. Our method of sampling is the same at each and every dock along the above frontage. The necessary tools used in sampling are a large sized trowel, a hammer, and a wide-mouthed can, with a capacity of about 45 lb. With these the sampler enters the boat when bottom is reached, sampling every hatch in the following manner: Starting from one side, he goes around the walls from bottom to top, taking one-half a trowel full of ore from every 18 in., the distance between his perpendicular sampling being 24 in. When lump ore is encountered, he takes a piece in bulk equal to the amount of fine ore taken on each trowel sample.

When he has filled his can, he dumps this upon a clean floor space in the boat, and proceeds sampling until each hatch has been sampled. After completing his sampling, he goes over his sample carefully, cracking up the lump, so that the entire sample can be homogeneously mixed together.

Our method of mixing the sample on the boat is by shovelling the ore from one pile to another, putting each shovel full on top of the cone until all the ore has been delivered from one pile to the other. After repeating this several times, the pile is flattened out by placing one corner of the cutting edge of the shovel in the top of the cone and circling the pile. This distributes the ore evenly and at the same time flattens the cone. The flattened pile is evenly quartered and the opposite quarters are thrown out. The above mixing process is continued, and if found necessary, the lump ore is crushed finer (this is done when 35 percent or over of the cargo is lump ore), and the last quartering—or about 100 lb. is saved and put into cans.

The amount of ore taken for each sample before mixing and quartering, depends upon the tonnage sampled, and as this varies, it is impossible for us to give you the exact weights, but, as a rule, 45 lb. to 55 lb. is taken from each hatch. The last two opposite quarters are taken to our crushing and drying house on the docks, weighed and dried at 212°; it is again weighed when dry and the difference is the amount of moisture in the cargo.

The sample is then taken and crushed in a Gates crusher, thoroughly mixed as described above, and about 10 lb. to 15 lb. is sent by express to our laboratory for analysis—the sampler keeping in reserve one-half of the last quartering—so that we can call for this should anything happen to the portion shipped.

The advantage, in our opinion, of having these drying and crushing plants on the docks is that a larger sample can be mixed in the dried and crushed state, better than the wet ore as it comes from the boat. Determining the moisture at the docks avoids all accidents that might happen to an undried sample in shipment and gives the proper percentage of moisture in each cargo on its arrival at the unloading dock.

In summing up the question of sampling all grades of iron ores that are delivered at lower lake ports, it is a difficult matter for us to state all conditions and variations that occur in this business. As a general rule no two boats are unloaded under exactly the same conditions, and no two cargoes of the same ore present the same surfaces, so it is impossible for us to instruct our samplers along any one general rule for sampling, other than those given above, which embrace, in a measure, the fundamental principles of sampling that we have adopted.

We believe firmly in large samples and endeavor in all cases to take them. By the term "Large Samples," we mean 300 lb. to 1,500 lb. to be taken for a sample. Of course, the amount depends upon the tonnage sampled, but roughly figuring the amount, we should say one-quarter of a pound per ton, this giving a sample that is a representative one.

Before the docks installed the present fast unloading machines, we used to take three rounds for each sample—sampling the ore in the boats when one-quarter unloaded and again when one-half out and a third time when three-fourths out—mixing all three samples together for our final sample, but now the time required for unloading is so short that three rounds is entirely out of the question. We believe and have proven beyond a doubt that one large sample taken when the boat is about one-half out gives the proper analysis of the ore.

The samples received at our laboratory having been dried at the docks, need no further drying and are run through a crusher that crushes them up until the ore will pass through a 15-mesh sieve. After crushing the sample, it is mixed on oil cloth by rolling and also by pouring the ore from one pile to another; opposite quarters being taken and mixed as above, until about 5 oz. are left. This is placed on a chrome steel plate and bucked down until all the sample passes through a 100-mesh sieve and thoroughly mixed by rolling. About 1 oz. of this ore is dried in a water bath at 212° F. placed in a bottle and corked tightly and allowed to cool. From this dried sample, all determinations are made.

*Abstract of a paper presented at the meeting of the Lake Superior Mining Institute, Menominee Range, October, 1905.

EQUIPMENT FOR PANAMA MACHINE SHOPS.

Washington, Nov. 14.—The Panama Canal Commission is planning to make further extensive purchases of equipment for its machine shops on the Isthmus, and proposals will, in the near future, be invited for items that will include the following: two band saws, 38-in. wheel and resawing attachment, two automatic saw-setting machines and frames, one iron frame ripping saw table for saws 24 in. in diameter, one 20-in. sawing wood turners' and pattern makers' lathe with iron bed, one car sill and timber dressing machine, extra heavy pattern, to surface two sides at once up to 24 in. wide or to surface four sides at once up to 12 in. wide, one 10-in. swing lathe, 4-ft. bed, one 18-in. swing 8-ft. bed engine lathe, one 36-in. swing 24-ft. bed engine lathe, one 30-in. upright drill, two sets of power plate bending rolls, two power double punch and shears, four Wells lights, 800 candle power complete, one 24-in. lathe with taper attachment, one 24-in. chuck, one 12-in. lathe with taper attachment, one 12-in. chuck, one drill chuck ½ by ¾ in. one 28-in. upright drill with 3 chucks, one 24-in. planer, one planer chuck, round base, 15-in. jaw; one 20-in. drill, and one No. 2 chuck.

The five-masted schooner Helen J. Seitz was launched this week from H. M. Bean's Shipyard, Camden, Me. The schooner is 271 ft. long and is building for the Coastwise Transportation Co. of Boston.

ANNUAL REPORT, LAKE SUPERIOR CORPORATION

The first annual report of the Lake Superior Corporation as presented at the annual meeting, held in Jersey City recently, is as follows:

Interest on Investments, securities of subsidiary Co.'s from net earnings	$543,455.02	
Net interests from banks, etc.	42,084.20	
		$585,539.22
Coupons paid 1st mortgage bonds outstanding	$452,174.60	
General expenses, taxes, etc.	98,562.14	
		550,736.74
Balance Cr. Profit and Loss		$ 34,802.48

ASSETS.

Investments and securities of subsidiary companies	$51,201,928.15
Cash	76,094.92
Collateral security	150,000.00
Treasury bonds	956,879.42
Furniture and Fixtures	353.82
Due from subsidiary companies (for advances)	1,531,542.60
	$53,916,798.91

In addition to the bonds in the treasury, there have been set aside and placed to the credit of the Algoma Central & Hudson Bay Railway Co., Cash, $61,652.67; first mortgage bonds, $345,000.00, to be used for the extension of its line.

LIABILITIES.

Capital stock	$40,000,000.00
First mortgage bonds	10,000,000.00
Income bonds	3,000,000.00
Bills payable	800,000.00
Canadian Improvement Co.	4,677.30
Coupons unpaid, Nos. 1 and 2	25,900.00
Due subsidiary companies	29,399.61
Suspense account	22,019.52
Profit and loss, carried forward	34,802.48
	$53,916,798.91

The principal portion of the report is devoted to a reference to the transfer of the different properties from the receiver to the new company, the restoration of working conditions, and the settlement of old indebtedness. The report then proceeds to state that the output of the rail mill was 12,138 tons of steel rails, fully meeting the extreme requirements of the Canadian railways. The Algoma Central & Hudson Bay Ry. and the Manitoulin & North Shore Ry., and the fleet of steamers have been operated profitably, mostly in carrying company's freight. The two traction companies at the Canadian and Michigan Soos show some loss for the year. The traffic is increasing, however, and it is expected will show better results the coming year. During the year 98,822 tons of steel rails were manufactured, and there were 11,262 tons of rails in stock on June 30, 1905.

No particulars are given as to the earnings of any of the separate companies. The subsidiary companies are eleven in number, and include the Algoma Central & Hudson Bay Ry., Manitoulin & North Shore Ry., British America Express Co., International Transit Co., Trans-St. Marys' Traction Co., and Algoma Steel Co.

A LETTER FROM THE SOUTHEAST SHOAL

The following letter, dated "Southeast Shoal, Lake Erie, Nov. 1," and written to an old friend, is very interesting reading: "You want to know how we are situated out here. Well, we are on the shoal, 4½ miles southeast of the old Point Pelee light, a shoal formed since your day—eight miles from Point Pelee and ten miles from Pelee island, right out in the open lake and with any easterly weather we simply get hell this time of the year, as there is the whole sweep of the lake, that is 200 miles, for the sea to make, and by the time it reaches us it is big enough and wild enough, I can assure you. We had a breeze from the N. E. last fall that attained a velocity of 78 miles an hour. All the big modern steel boats had to turn back to Buffalo that time and several were lost, but we couldn't run anywhere, we had to stay here and take our medicine, and it was a nasty dose for twenty-four hours, but we came out O. K. We have been here for five years and have not run for shelter yet, although we would often like to do so. In that last breeze of Oct. 21, the Tasmania, a schooner of 1,500 tons, foundered two miles from us. We were watching her from the lightship at the time, but the wind was blowing 80 miles an hour so it was out of the question to think of going to the aid of the crew, and by daylight there were none of the poor fellows left to go to. There was a fleet of forty big modern boats in shelter under Pelee island in that breeze, and sometimes we have seventy-five or eighty in shelter up in Pigeon Bay in an easterly gale.

"We are in a little steam barge, 100 ft. long by 24 beam, and look rather cheeky staying out in the lake in the teeth of it while a 500-footer is running for shelter. We are owned by the Lake Carriers and handled by Captain George P. McKay, whom I guess you have met, one of the finest and most reasonable men that ever managed a steamboat. We have a crew of four men, engineer, mate, cook and myself. I tell you a game of cards goes good in the summer months. Each man has five days a month liberty ashore, and it is fun to board any passing freighter from our small boat and sail up to Detroit river and get off with Duff and Gatfield at the Lime Kiln Crossing."

F. J. H.

ESTABLISHING A MARINE LABORATORY

It now seems to be an established fact that San Diego, Cal., will soon have one of the best and most complete marine laboratories in the west. Through the untiring efforts of Prof. William E. Ritter, of the University of California department of zoology, the people of San Diego have been brought to a full realization of the value and distinction which that city will derive from the possession of such an institution.

It is understood that the San Diego Marine Biological Association, which is taking up the important enterprise, is composed of a large number of the wealthiest and most influential men of that city. The association promises to endow the institution with a sum sufficient to give it a yearly income of $10,000, besides building a large laboratory, museum and aquarium, with a full equipment of apparatus.

The system of work will be somewhat similar to that employed at certain important astronomical stations; that is, there will be one great purpose toward the fulfilment of which the efforts of those working in connection with the laboratory will be directed. A regular staff of scientists will be employed, who will give as much of their time to research along the lines laid down by the institution, as is compatible with their other duties.

The establishment of this big undertaking has been one of the most cherished projects of the University of California Zoological Department, but lack of funds has prevented its being carried out until the present time. The work of the department up to the present has been merely fragmentary, consisting of the annual summer school of biology in the southern waters of California, supplemented by occasional excursions into other fields, these expeditions being, as in the case of the Harriman expedition, largely private ventures.

The Baltimore & Carolina Steamship Co., Baltimore, Md., is having plans and specifications drawn for a new steamer to run in conjunction with the George Weems. The new vessel will be 200 ft. long and 32 ft. beam.

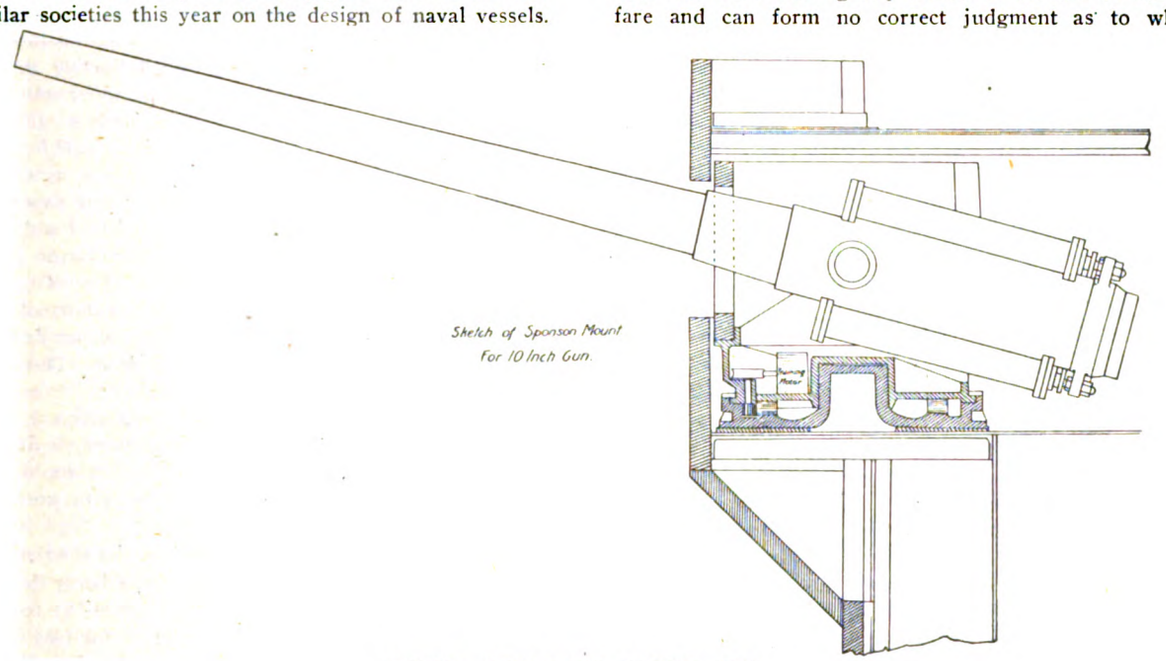
EXPERIENCE GAINED IN RUSSO-JAPANESE WAR.

Material Factors Brought out by the Great Naval Contest.

A TALE FROM JAPAN

The thirteenth general meeting of the Society of Naval Architects and Marine Engineers opened in the auditorium of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York, on Thursday of the present week, the sessions continuing throughout Friday and ending with the customary banquet on Friday evening. A full report of this meeting will be made in the next issue of the *Marine Review*. One of the papers "A Tale From Japan" by Mr. George W. Dickie, is published herewith and the other papers will be published as room can be provided for them in the future. Mr. Dickie said:

"There will undoubtedly be many papers read before this and similar societies this year on the design of naval vessels. For the first time in their history there has been real fighting between modern, steel armored, warships, and out of this battle experience there must have come much data in regard to what was dispensable and what was indispensable in the present design of fighting ships on which the nations are spending so much thought and treasure. Just at the time Admiral Togo was making the Russian fleet a thing of the past, a Japanese naval constructor, a personal friend of mine, wrote to me in the following significant words: "The experience of the Russo-Japanese war gives us very interesting lessons in warship design; but most of this information is still kept secret, as our intention is to build warships in our own country. The main items in warship-building are to face high explosives, protection against mines, high speed in battleships, rapidity of firing guns; these are the most important material factors that bring victory in naval battles. Beside the above-stated material factors, we have to consider the education, spirit, discipline, etc., of the men; that is more than half what is needed to give victory. I mean that the moral point of view is more important than the material point of view. Thus the fleet of a country should be built up to suit the spirit of the men who handle the vessels." I am so impressed with the statement of my Japanese friend that I cannot let it alone, complete and comprehensive as it is, but have concluded to use it as a text for a paper to be presented to this Society. My attitude relative to questions pertaining to warship design is not quite the same now as it was when presenting my paper on "Simple Methods in Warship Design a Necessity" last year. Having changed my position and thereby got out of the range of the contractor's fire, I can, without any danger to myself, discuss any problems growing out of the statement made by my Japanese friend with perfect freedom, and I think also without any motive in view, except that of reaching a satisfactory answer to the problems suggested. The Japanese are to make practical use of the experience gained in their great naval battles; the Russians have gained no experience, and could not to-day improve on the ships they have lost; they have not been seeking experience in the art of naval warfare and can form no correct judgment as to why they could not make a better fight against a fleet that theoretically was no more powerful than their own, and when they build new ships, which they probably will do, they will not be designed out of the experience gained in battle, for that to them has been only a nightmare of destruction. But the Japanese have had an interesting experience which they propose to keep to themselves and build their own ships in the light of it. This experience will not be confined to warships alone, for out of it will come a great expansion for the merchant marine of Japan. When she fought with China, Japan had few merchant vessels and fewer war vessels, but that war gave them some experience, and their government resolved to encourage not only shipbuilding but the establishing of steamship lines to various ports of the world. The nation found out what was necessary to stimulate her shipbuilders and ship owners to activity, and promptly did the necessary thing. They had experienced the want of a merchant fleet to do the necessary transport and freight work to make the war fleet effective, and set about remedying the defect. Now, while Russia had to hire or buy all sorts of merchant steamers from foreigners to make it possible for her war fleet to be used at all, Japan had all this ready and manned by her own citizens.



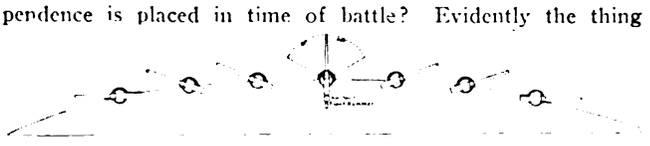
SPONSOR MOUNT FOR 10-INCH GUN.

She had a line of steamers from Yokohama to Melbourne with three large steamers of 16 knots speed; a line from

Yokohama to Bombay, three large steamers, 10 knots; a line to European ports, twelve large steamers, 14 to 16 knots; Hong Kong to Seattle, three large steamers, 15 knots; Hong Kong to San Francisco, three large steamers, 17 knots; Also steamers running from Yokohama to Shanghai, Kobe to north China, Kobe to Corea, Kobe to Vladivostok, and others, about fifty large steamships ready in her time of need. The advantage of a merchant marine in which the government owned an interest has been such a prominent factor in her successes both on sea and land, that its future extension will be a legitimate outcome of the experience gained in this great war. The United States has not shown the wisdom of the Japanese in this respect. The Spanish war taught the same lesson to us as the China war taught the Japanese, but so far we have not profited by the experience. Had the Japanese acted as the United States in regard to her merchant fleet, the Russian fleet might have still been in active service.

Coming now to warship building in the light of the Japanese experience as expressed by my friend in regard to the important items to be relied upon to gain the victory.

The wreck and ruin wrought by shells charged with high explosives has, I suppose, been fearfully illustrated for the first time in naval warfare. The question is what, if anything, can be done to protect the warship against this terrible power of destruction? Can the construction of the warship be modified in any way so as to make it more effective in keeping out the shell charged with high explosives? If the vessel is penetrated, can we have more simple internal arrangements so that the damage done by a bursting shell will not destroy so much delicate mechanism upon which dependence is placed in time of battle? Evidently the thing



AMMUNITION HOIST FLEET RAMMER.

to be dreaded in naval warfare is the shell charged with high explosives, provided it does not require to penetrate the armor protection in order to be effective; if the explosion of a shell on the outer face or the armor without penetrating can cause fatal damage, then a new condition has been reached, and accuracy of fire at extreme long range becomes of vital importance. It does not appear, however, that any heavy armor, say 8 in. and over has been destroyed in the late war by the explosion of shells on the outside. The experience from the Russo-Japanese war, as far as outsiders have been able to reach it, would indicate that naval battles in the future, when the opposing forces are nearly equal in strength and ability, will be fought at long range unless the heaviest armored ship is also the fastest, in which case she would shorten the range as quickly as possible, and thereby save time in destroying her opponent. It does not appear that there is any need for two classes of vessels so near alike in strength and speed as the battleship and the armored cruiser, as in the late war the battleship did not appear to do anything that the armored cruiser could not do. I believe that a strongly armored fighting ship, having a speed that could be maintained at all times of 20 knots, would accomplish as much and probably more than either the battleship or armored cruiser. I believe that in order to get a simple structure that could be armored effectively, the turret battery would have to be abandoned and the main battery installed between the main and upper decks. The whole vessel to have armor protection from 5 ft. below the normal waterline to above the upper deck. For simplicity in the manufacture of armor and fitting it, all sectional lines both fore and aft to be vertical at all points from the armor shelf up, there being no curvature except in one plate, and all decks should be without curvature in either direction.

The main battery should be all high-powered rifled guns of the same caliber, which I think should be 10 in., and mounted in sponsons. The gun shield, which for this size would be about 10 ft. in diameter, forming a complete cylinder, except for the opening of the breech of the gun; it would be the same thickness as the side armor, which I propose should be 8 in. all over, except at the ends, which in 30 or 40 ft. would taper down to 6 in. at the bow and stern. The gun shield would close the port with a lap of about 6 in. at the top and bottom. The inside diameter of the sponson armor would be about 3 in. greater than the outside diameter of the shield, leaving an average clearance of 1½ in. A plaited hemp gasket would be driven into the space to keep out water at sea. The port hole for the gun through the shield would just give clearance for the gun horizontally and room for the vertical train. There would also be an opening for the telescopic sight and peep holes for observation. These openings would be closed with proper fitting tompion plates at sea. The ammunition hoist would be immediately behind the gun when trained abeam, and the electric rammer would be secured to the deck behind the ammunition hoist. I have figured that a warship having the following dimensions—length, 450 ft.; beam, 75 ft.; draught of water with 1,500 tons of fuel in bunkers or tanks and two-thirds of full supply of ammunition, 26 ft., and a co-efficient of .6, could have a battery of fourteen 10-in. guns arranged in sponsons, as shown in the sketch plan and elevation accompanying this paper. At 27½ ft. draught she would have 2,200 tons of fuel and full supply of ammunition, which would be 100 rounds for each of the 10-in. guns. The secondary battery would consist of fourteen 14-pdr. rifles, all on upper deck. The armor all round the ship to be carried 30 to 36 in. above the upper deck, forming a shield protecting the fittings on the deck. There would be no wood on the upper or weather deck; linoleum or fibre would be fitted, secured by special brass strips at seams and butts. The center line of the main battery should be 20 ft. above the waterline in normal trim, and it would require 11 ft. clear betwen the main and upper decks to work the 10-in. guns.

The ammunition would be served to the ammunition hoists from an ammunition passage below the berth deck on each side extending from the magazine forward to the magazine aft. These passages to be wide enough for two ammunition trucks, and at each hoist there would be an enlargement to give room for handling. Trolleys with ammunition from forward magazine when unloaded would continue on to the after magazine and there load and come back the other track, unloading at whatever hoist required ammunition and continue on to the forward magazine. The 10-in. ammunition hoists would be similar to the turret hoists now in use, the charge being pushed from the hoist cage into the gun. The hoists for the 14-pdrs. would be of the endless chain type.

Above the upper deck there should be as little top hamper as possible; there would be skid beams for the boats and both forward and after bridges for navigation purposes only, searchlights being on the ends of the bridges. I believe that the military mast will not now be considered necessary, and simple pole masts, suitable for signaling and telegraphic purposes and fitted with crow's nest for outlook, will be all that will be fitted in the future.

What I have outlined would, in my opinion, prove a very efficient fighting ship, and her complete armor, though only 8 in. in thickness, leaves no part unprotected. I consider a general protection that would be effective, except at short range, to be more efficient than some thick patches of heavy armor protecting what is supposed to be vital parts, but leaving other parts, that in battle may be quite vital, entirely unprotected. The main battery consisting of 14 powerful units, each independent of the other, and extending over

the whole ship, ought to give more opportunities of good work in battle than when the main battery is installed in two or four turrets, with their intricate mechanism and the large masses to be moved, all of which may be rendered helplessly useless by one well-directed shot. Of course, the 10-in gun on a pivot mount installed in a fixed sponson, the mount carrying a shield to close the port, is not a simple arrangement, as it would require electric training and elevating gear; but even if the same shot that could disable a turret could disable the gun mounted in an armored sponson, the loss of one gun would not affect the ship as would the disabling of a turret.

My friend also wanted protection against mines. I can conceive of it being quite possible to fit to the bow of a warship a sort of a cow-catcher on a scale proportioned to the size of the ship, say a steel spar fitted into a truss secured to the stem 6 ft. above the waterline and braced fore and aft by braces running back to the skin of the ship, also vertical braces to support the spar. Another spar would be fitted at the upper deck line, similarly braced; these spars would be, on the ship I am describing, about 12 ft. apart; there would be slotted plates on the forward side of the lower spar and on the after side of the upper spar, to receive steel bars, having a sort of a bulb section to give them lateral stiffness; they would be spaced say 10 in. apart, and would be about 46 ft. in length, their lower ends being below the keel line of the ship; they would also be raked forward at the lower end so as to be in advance of the ship. The full width of the device would be greater than the width of the vessel. I believe it practicable to carry such a device on board and to place it in operation in two or three hours; the bars or teeth of this big "comb" would clear a path for the ship to which it was attached, the great drawback being that the speed would have to be kept under 10 knots. If this kind of thing would not work I am afraid that I cannot help my friend about the mines.

In two hostile fleets, the one that commands the highest speed in all his ships can choose the distance at which he will fight. This advantage is of the first importance. The quality of speed, however, to be supremely effective must be possessed by all the fighting ships of the fleet. I believe that about 20 knots is the best practicable speed for the big fighting ships; that speed should be readily obtained and maintained as long as the fuel will last. The steam turbine, when it reaches its full development, will present possibilities in this respect that the present type of engine cannot reach. High speeds then will simply be a question of steam supply, and with liquid fuel applied to naval vessels, which it ought to be now, the steam supply will also be an easier problem. The question of supplying fighting ships with fuel at sea will also be solved by liquid fuel. The United States is in a better position in regard to the application of liquid fuel to her naval ships than any other nation. It can be more readily stored at naval stations than coal, and does not suffer by storage. The steam turbine and liquid fuel will, I think, help my Japanese friend in the speed question, but he must be careful to protect his bunkers against the possibility of puncture by a shot, as liquid fuel is not a pleasant thing to get outside the bunkers.

I would like to add one word, which I believe to be quite important, to this requirement of my Japanese friend and have it read—"rapidity of firing guns accurately." It appears that the Russians fired their guns more rapidly than the Japanese, but did not hit so often. I somehow think that the single gun, with the kind of mount that I suggest, can be fired more often and more accurately than the guns in a turret, and the firing would be divided among more gun crews, with more chances of successful shots. It is not he that fires his gun most frequently, but he who hits his enemy oftenest in the place aimed at that is going to win the battle.

The foregoing is what my Japanese friend terms the material factors in naval warfare, but he claims that the moral point of view is more important than the material point of view, stating that "The fleet of a country should be built up to suit the spirit of the men who handle the vessels." The Japanese naval architect, perhaps, knows more about the spirit of the men who are to handle the ship that he designs than our naval architects do. They are all Japanese; have a spirit of great courage and activity, and will execute any order given apparently without any thought of self. This kind of spirit counts for much in the Japanese crew, and enables them to plan simple ships for their navy. They do not care for elaborate and easily deranged mechanism for performing any function or work that manual dexterity will do. I understand this to be one of the experiences that has come to them out of the late war. Some time ago the executive officer on a U. S. battleship took me to the berth deck to show where a mistake had been made in locating a controlling switch for an electrically operated hatch. In order to get at the place to show me the difficulty in handling the controller, he had to wake and push out of his way half a dozen men who were sleeping on the deck about the hatch. Now any one of these men could, with an ordinary whip, have operated this hatch and in less time than the complicated electric device that had been planned with considerable skill, and fitted at considerable expense, to perform this function. It also required far more time to keep it in working order than the time that would be expended operating the hatch by hand. This is designing and building ships to suit the want of spirit of the men who are to handle them. I have often expressed before this society my conviction that much of the mechanism installed in our warships for operating fittings that can readily be operated by hand is not only a waste of money and mechanical skill, but is positively an element of danger in time of battle. In time of peace, on the regular inspection days, when everything is supposed to be ready to operate, many of these devices fail to function and need the presence and help of experts to get the required result. In time of battle, a hand-operated device will work in some manner, even if it will not function in the regular way; but delicate mechanism once deranged, even slightly, is usually inoperate altogether until repaired by experts. So many mechanical devices are required on a modern battleship for operations that cannot be done by hand that whatever can be operated by hand should not be complicated by delicate mechanism for doing what the human hand is so well fitted to do. I think that it will be found that there is much truth in the statement of my Japanese friend "That the war fleets should be built to suit the spirit of the men who are to handle them." We have, I think, been building warships to suit the spirit of electricity.

I do not know if this short paper is of any value or in any way worth a place in the transactions of this society. I would have liked to prepare complete plans of a battleship, with the main battery consisting of fourteen 10-in. high power guns, all arranged on the main deck, as shown on the outline sketch, the mounts to be arranged in sponsons, as shown on sectional sketch, the secondary battery, consisting of fourteen 14-pdrs., arranged on the upper deck. The idea being a flush-decked battleship giving all the weight possible to a complete armored skin, from 5 ft. below normal waterline to 30 in. above upper deck. This complete armor skin exclusive of the 10-in. gun shields would weigh about 4,200 tons. The whole skin being protected, there would be no internal armor. This idea may not be new, and may have no value. It originated out of my Japanese letter, and is now presented to the society in the hope that it may provoke discussion which, on such a subject, is always interesting, and at the present time should be especially so. Even the discussion of a foolish idea, by wise men, should it establish the wisdom of present practice, would be well worth the trouble of answering a fool "not according to his folly."

DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED OR ASSOCIATED WITH MARINE MATTERS ON THE FACE OF THE EARTH.

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Some of the newspapers last week were so frank as to refer to the action of the executive committee of the Lake Carriers' Association in deciding to petition congress for appropriations for a new channel at the Lime Kiln crossing, as impudence. They were also pleasingly compared to leeches. These newspapers, of course, take the view of it that the appropriations are for the exclusive benefit of the lake carriers, overlooking the fact that the real beneficiaries are the people of the United States. The deepening of lake channels can give but an indirect benefit to the lake carrier. What personal benefit he would reap is instantly taken away from him by an automatic reduction in the freight rate. In point of fact the deepening of channels has well nigh ruined a number of individual vessel owners whose vessels were of small capacity, since it has made them hopelessly inadequate to compete with newer and larger tonnage. This is a feature of the general evolution of industrial life from which it is impossible to escape. It follows as absolutely as the night follows day. The big ship is the inevitable outcome for modern conditions. It is taking a very narrow view of the subject, however, to say that the owner of the big ship gets the exclusive benefit. The real benefit is bestowed upon the whole people.

That this is so is clearly borne out in the annual report of General Alexander Mackenzie, chief of engineers of the war department. He makes some very pertinent remarks in his report. He shows that the saving in freight rates paid on the commerce of the single port of Duluth for the year 1904 was greater than the total amount expended by the government since it began its extensive policy of improving lake channels. If this is so for a single port, how much more must it be so for the whole chain of ports, General Mackenzie points out in his report that the average rate on freight passing through the St. Mary's Falls Canal in 1904 was .81 of a mill per ton per mile. He says that if the same freight had been carried by rail, the rate would probably have been as much as 3 mills per ton per mile, making a difference of 2.2 mills per ton-mile. That the difference is greater than this is very well known, the average rate on the great trunk lines of the United States being about 4 mills. But using the conservative estimate of General Mackenzie of 3 mills, it is shown that in the haul of 900 miles which the commerce of Duluth harbor underwent, the saving in cost of transportation by water is $1.98 per ton. For the 16,617,017 tons that were received and shipped at Duluth in 1904, the saving in cost amounts to $33,000,000 for that one year.

What more convincing argument for the improvement of our waterways can be made than this? That $33,000,000 was saved to the people of the United States. It was saved for the consumer, for if that sum were to be added to the cost of transportation it would have to be added to the cost of the article transported. The consumer in purchasing the article would pay that cost. And yet a lot of little newspapers howl about appropriating a million or two to make a new channel at the Lime Kiln crossing. A chain is no stronger than its weakest link, and the weakest link in the whole chain of lake channels is the Lime Kiln crossing. It would be economy to put a new channel through there if it cost $20,000,000 to do it.

This year's convention of the Ohio River Improvement Association, which is now being held at Cairo, Ill., will undoubtedly be among the most important meetings that the association has held since its organization. While this association is in convention, however, there are a few points which it should not overlook. The people of the Ohio valley are all enthusiastic over the probable improvement of the river and its tributaries, but must not let our enthusiasm blind them. There are other sections of these United States, the residents of which are desirous of the cheap transportation which improved rivers and harbors afford, and they are entitled to more than passing consideratian. Before 9-ft. navigation is asked for, let it be fully understood what is meant. We

find some discussing "a 9-ft. stage," others "a 9-ft. channel," and others "9-ft. navigation." Do the people of the Ohio valley wish sufficient water to float craft of 9-ft. draught?

We must not lose sight of the fact that improvements looking to 6-ft. navigation are under way and that the government has spent considerable money for this purpose. Such statements as those which have appeared from time to time in some of the daily papers, that boats loaded at Pittsburg, or other points on the Ohio, can be taken through the Panama canal when finished, deserve no consideration. Think of a boat of 9-ft. draught out on the high seas!

All attention should be given the Ohio proper, the improvement of its tributaries should be delayed. This applies especially to smaller streams. It is not intended that the improvements now under way or those completed should be allowed to deteriorate; but no new river improvements should be undertaken until those of the Ohio are well advanced.

Let the improvement of the Ohio be systematic. Give slack water from Pittsburg to below Wheeling—the most troublesome section—for 6-ft. or 9-ft. or 12-ft. navigation, but let us have a working idea of what slack water will be on the Ohio. The dam just below Wheeling is numbered thirteen; the first dam above, which is open to navigation, is numbered six, leaving six dams to be built before number thirteen will be of any actual benefit to general navigation on the Ohio. At the present rate of progress, it will require at least ten years from the date the structures are authorized before this will be realized. The first appropriation for Dam No. 13 was made March 3, 1899, and today the lock (about one half the whole work) is not completed.

Special attention should be given to encroachments. This is one of the evils which must be eradicated. The improvement of the Ohio should be put on a business basis. Business methods should be introduced; the works should be under one head.

SHIP BUILDING DURING OCTOBER

The bureau of navigation reports 94 sail and steam vessels of 20,249 gross tons were built in the United States and officially numbered during the month of October, 1905, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam			
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No	Gross
Atlantic and Gulf	37	6,388	20	563	....	.....	3	1,417	60	8,368
Porto Rico	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pacific	3	814	9	374	....	.....	.....	.....	12	1,188
Hawaii	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Great Lakes	.....	.....	4	252	.....	.....	3	9,912	7	10, 164
Western Rivers	.....	.....	14	378	.....	.....	1	151	15	529
Total	40	7,202	47	1,567	....	.....	7	11,480	94	20,249

There are no less than sixteen distinct steamship lines operating between New York and Mediterranean ports. Ten of them have been the development of the past seven years.

NEW IRON ORE DOCK

Duluth, Minn., Nov. 14.—The Duluth, Missabe & Northern road has taken first place in the ore business from mines to upper lake ports. It will ship this year about 8,500,000 gross tons and is making improvements and additions that will fit it, in 1906, to move with the utmost ease the enormous total of 10,000,000 gross, or 11,200,000, net tons. This is in addition to its general traffic in merchandise, coal, logs and lumber, etc. In logs and lumber the road has a business amounting to hundreds of millions of feet per year.

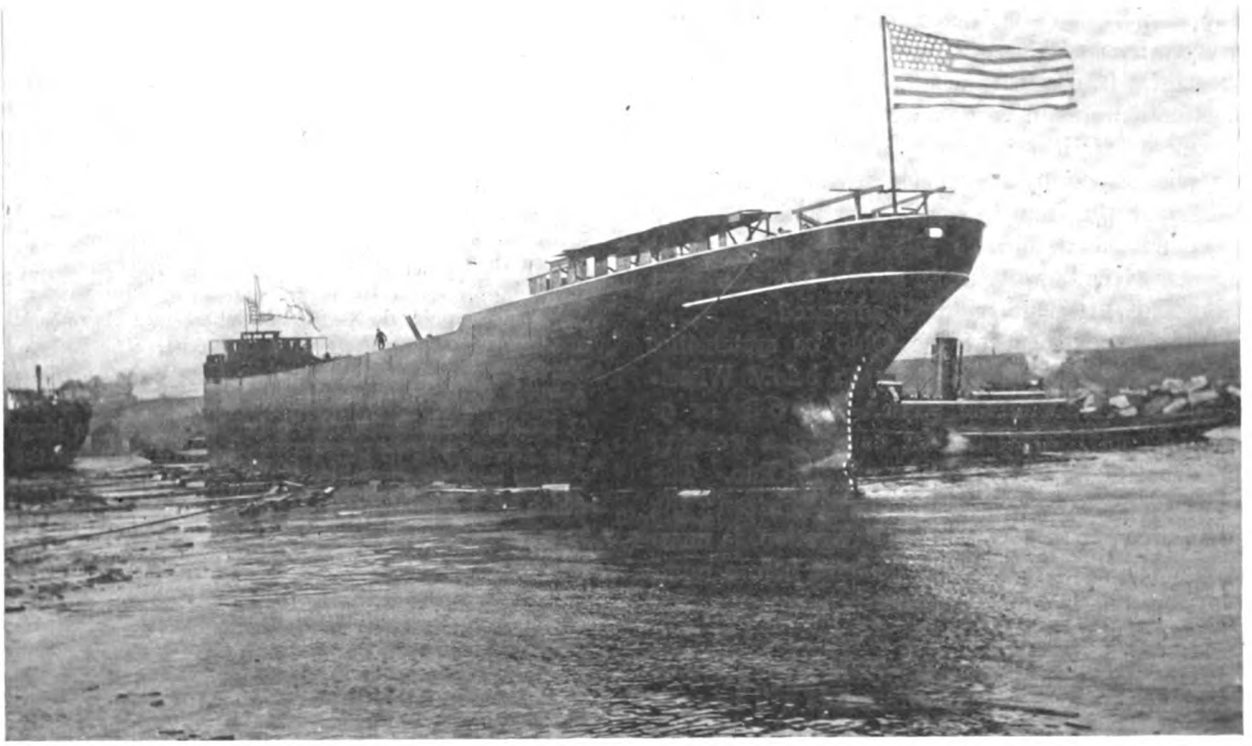
This road is now preparing to build an ore shipping pier at Duluth that will cost, with approaches, $1,000,000 and will be the largest dock of its class in the world. Detail plans are not yet completed but many new features will be adopted in its construction, and it is safe to say that it will be the most up-to-date and capable shipping pier to be found. This dock will be 2,336 ft. long, aside from approaches, and will require upwards of 12,000,000 ft. of timber, mostly western fir.

The proposed dock is to be 42 ft. to hinge hole, which is a greater height above water for the low point of the load of ore than any other pier. These heights have varied, in docks now in use, from 25 ft. to 40.6. The former is the height of the older dock of the Duluth, South Shore & Atlantic and bars any large ships from that port. The Milwaukee & Northwestern roads, at Escanaba, the Wisconsin Central, at Ashland, the Great Northern & Duluth; Missabe & Northern, at Duluth, have docks with a height of 40 ft. to hinge hole. The new pier is to be 72 ft. to base of rails, on the deck, thereby exceeding any others but two of the Great Northern, which are 1 ft. higher. It is to be 57 ft. wide. There are to be 384 pockets and a total storage capacity of 90,000 gross tons. The pockets will not be narrowed to a 3-ft. chute at the discharging end, but will be fitted with the Carter patent door and wide chutes, the door in three sections, 11 ft. in width, and the chutes corresponding. This style is in use at No. 6 dock of the Northwestern road, at Escanaba. It is estimated that by thus retaining the full width of pocket to its acute angle there will be added to the storage capacity of this dock about one full modern cargo, while the wider doors will prevent wet and sticky ore clogging in the gates. The chutes will be fitted with the Denton patent counterbalance hoists. All the main rafters and partition posts of the structure, timbers are hard to reach, will be treated with creosote. There will also be a construction designed to ventilate timbers liable to gather moisture. Along the entire two faces of the docks will be four lines of heavy longitudinal girts, and these will be bolted clear through from side to side of the pier. There will be heavier bracing longitudinally to take up the stresses from moving and stopping trains. The dock decking will be of 6-in. plank, exceptionally heavy. The pockets will be shod around their corners with steel angles, and the weight of iron in the structure will be far heavier than ever known. The customary trackage on modern ore piers consists of a set of four rails, even spaced, running the length of the dock, over each side. This gives three tracks over each set of pockets, the two outside or the one center available for use simultaneously. In this dock there will be four rails, but spaced for two tracks only, as it has been found unnecessary, with the 50-ton loads of modern ore cars, to trim the pockets by dropping loads between the tracks. This will give a four-track system on the docks. There will be a double track approach with independent connection to the main line, running level to the deck of the pier. At the outer end will be a concrete monolith instead of the usual rock-filled timber crib. The entire dock will rest on pile foundation.

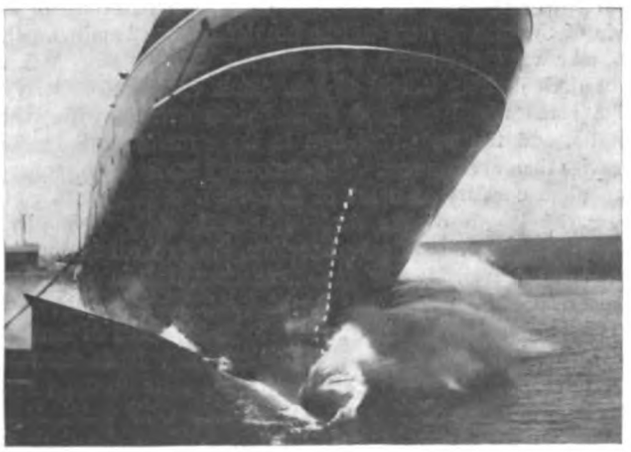
A broken blow-off pipe caused the steamer F. H. Prince of the Rutland Line to put into Port Huron for repairs last week.

LAUNCH OF THE PENDENNIS WHITE

The steamer Pendennis White, building for Capt. John Mitchell, of Cleveland, was launched at the Cleveland yard of the American Ship Building Co. on Saturday morning last and was christened by Miss Virginia White in honor of her father, who is one of the prominent business men of Buffalo. The White is the first of the three steamers building for Capt. John Mitchell by the American Ship Building Co. to be launched. She is also the smallest of the bulk freighters that have been ordered for 1906 delivery, being 436 ft. over all, 416 ft. keel, 50 ft. beam and 28 ft. deep. She will have triple expansion engines with cylinders 21, 33½ and 57 in. cylinder diameters by 42-in. stroke, supplied with steam from two Scotch boilers 12 ft. in diameter and 12 ft. long. The launching party included Mr. and Mrs. Pendennis White, Miss Virginia White and Miss Dorothy White of Buffalo; Mr. S. Anderson and Mr. H. A. Magoon of the marine department of the Maryland Steel Co., Sparrow's Point, Md.; Mr. John F. Wedow, Miss Elizabeth Wedow, Mrs. J. B. Wedow, Mrs. Calista Mitchell, Capt. and Mrs. John Mitchell, Capt. and Mrs. Alfred Mitchell, Mr. Ralph Mitchell, Miss Isabel Mitchell, Miss Calista Mitchell, Mr. and Mrs. Charles Marston, Mr. Robert Wallace, Mr. James C. Wallace, Mr. Robert Logan, Mr. R. C. Wetmore, Mr. Edward Mitchell and Mr. A. W. Mitchell of Cleveland. Immediately after the launch, luncheon was served for the launching party at the Union Club.



STEAMER PENDENNIS WHITE IN SLIP AFTER LAUNCHING.



STERN OF PENDENNIS WHITE STRIKING THE WATER.

MEAN STAGES OF WATER

The gauge records of the United States lake survey show the following mean stages of water above mean sea level, for October, 1905:

	Stages during October Feet.	Higher than during same month last year. Feet.	Lower than during same month last year. Feet.	Higher than during Oct., 1895 Feet.	Lower than during Oct., 1895 Feet.
Lake Superior	603 42	0.16	....	0 28	.....
Lake Michigan	580 94	....	0 12	1.63	.....
Lake Huron...	581.33	....	0 03	1 58	.....
Lake Erie.....	572 62	....	0 17	1 52	.....
Lake Ontario.	246.57	....	0.27	2.93	.....

Present fall Lake Huron to Lake Erie, 0.14 ft. more than year ago.

Ship builders will be interested in the recommendations regarding cable boats which will be made in the forthcoming annual report of the chief signal officer of the United States army. He states that it is impossible for the cable boat Cyrus W. Field to keep in repair the cables now laid. He recommends that one sea-going and two harbor cable boats be built.

The steamer Indianapolis, which formerly ran between Chicago and Michigan City, reached New York last week to be fitted out for her long voyage to Seattle, where she will ply in the service of the Alaska Steamship Co.

TECHNICAL DETAIL ABOUT TURBINES

A paper on "The Determination of the Principal Dimensions of the Steam Turbine, with Special References to Marine Work," was read before the 49th session of the Institute of Engineers and Shipbuilders in Scotland, at Glasgow, on Oct. 24, by Mr. E. M. Speakman. At the outset Mr. Speakman pointed out that in designing any turbine installation, the first and most essential step was to estimate the highest suitable speed of rotation, in order that the turbine might be made as small as possible for any given efficiency. Turbine efficiency and propeller efficiency must be considered separately and also together, because it might be found that the use of revolutions somewhat below the maximum obtainable would increase the combined efficiency, while on the other hand, to obtain certain advantages in weight and space, this efficiency might be slightly sacrificed at the highest speed, and it was necessary the effect of such modifications on the design and performance. Roughly, the weight of the turbines would vary inversely as the square of the revolutions, while the economy of the turbine would remain almost constant if designed for the same internal conditions; the efficiency of the propeller would be slightly improved as the revolutions decreased, and the diameter was made greater. Cavitation was partly the result of attempting to obtain too much work per square foot of blade area, and partly of excessive peripheral speeds.

It had been found, by bitter experience occasionally, that there was a narrow limit to the tensional pressure possible on the water, per unit of projected area, beyond which the propeller efficiency dropped very rapidly. This pressure was approximately from 10 to 12 lb. per square inch at a depth of 12 inches below the surface, and to reduce the total thrust to this, sufficient blade area must be provided, which, in conjunction with certain practical proportions, necessitated a certain size of propeller, thereby limiting the revolutions. Friction and slip constituted the normal losses in all propellers, and augmented resistance must also be taken into account. This latter loss, however, was materially reduced with the smaller diameters of propeller found in turbine work. Comparing the Manxman with the Ulster—a Holyhead mail boat of similar speed and power—the total disc area of the twin propellers of the latter was 226 sq. ft. (for two 12-ft. diameter propellers) while that of the Manxman was only about 80 sq. ft. If the thrust deduction was proportional to the absolute area of the disturbance of the steam lines at the stern, the effect on the Ulster would be far greater than on the Manxman, but this action was to some extent affected by the intensity over the disturbing area, which again was modified by the proximity of the propellers to the side of the vessel, this being less in turbine work. Cavitation was a preventable loss, and its presence on many vessels with insufficient blade area might be deduced from the falling off of the thrust curve and the rapid rise in the ship curve above a certain speed.

The pitch ratio for turbine propellers had been purposely made considerably finer than usual. Thus the pitch ratio for the Emerald was about 0.6; in channel steamers and cruisers of from 18 to 20 knots, it had varied from 0.8 to 1.0, and in torpedo craft from 1.0 in H. M. S. Velox to 1.35 in H. M. S. Viper, and 1.6 in H. M. S. Cobra, the latter vessel having one, two and three screws per shaft respectively driven by identical turbines, the approximate revolutions at full speed being 900, 200, and 1,050 for 27, 36, and 31 knots respectively on trial. The percentage of slip had varied from 28 percent in H. M. S. Viper, down to about 14 percent in the Viking, channel steamers having about from 17 to 24 percent. For large ocean-going vessels, about 16 to 20 percent might be used with due regard to other considerations of propeller efficiency. The section of the blades should be carefully designed in order to try to obtain a shape that would enable as high a mean pressure as possible to be adopted. The best form of blade was still undetermined, but experience seemed to show that the almost circular shape, with the area disposed symmetrically on each side of the center line, and with the generating line of the screw at right angles to the axis, gave as good a result as any form.

The more propeller efficiency was studied and understood, the greater would be the improvement in the design of turbine installations for marine work; the turbine itself was a comparatively secondary consideration, and while at present propeller dimensions for turbine steamers could be quite as closely determined as those for ordinary work, the exact proportion must necessarily largely remain subject to modification from actual experience. While a general tendency toward increasing the propeller diameter and reducing the revolutions, there would of course be some point, at present undetermined, at which the triple screw used in turbine work would be distinctly less efficient than ordinary twin screw. Very largely this was the case at present with triple screws driven by piston engines, on account of excessive thrust deduction and interference, but probably before this point was reached, the weight of the turbines would have prevented its adoption. Having obtained the diameter of the propeller and the revolutions possible, the design of the turbine could then be undertaken, but for this no formulæ existed at present, such as were met with in reciprocating engine practice. The author proceeded to deal with his subject at considerable length, with much technical detail, and in conclusion he observed that while turbines perhaps were still in their infancy, they were already largely supplanting the reciprocating engine in many types of vessel. The next few years would undoubtedly show as great an improvement as had taken place since the advent of King Edward barely five years ago, the more especially as the subject would, henceforward, be engaging the attention of all engineers, instead of a few specialists, and that this improvement would more than justify the policy of the Admiralty and of the Cunard company was already certain.

MODEL C BULKHEAD DOOR

NEW MODEL "C" LONG ARM" POWER DOOR.

The bureau of construction and repairs, of the navy department, after severe tests, has approved the new Model C electrically operated bulkhead door made by the "Long Arm" System Co., of Cleveland, O. The ships for which this door was specifically approved are the Montana and North Carolina. The tests demonstrated that the door was fully capable of closing through coal and its watertight qualities were demonstrated under high pressure. The nominal leakage of the doors under this pressure was so small as to give entire satisfaction to the representatives of the bureau who witnessed the tests.

In the course of the evolution of the Long Arm system power doors, some minor defects developed in the first models. These defects have been overcome in the Model C door, which is more direct in its operation, simpler in design, and, therefore, easier to keep in good condition than were the earlier models.

BLOCKED ST. CLAIR FLATS SHIP CANAL

The steamer J. M. Jenks owned by W. A. Hawgood of Cleveland became disabled Wednesday evening of this week just above the upper end of St. Clair Flats Ship Canal while bound down with a cargo of ore, and swung directly across the mouth of the piers, completely blocking navigation and holding up a large fleet on either side. There is only one instance on record where a similar accident occured at the ship canal, that being about eight years ago, when the steamer Corsica drifted across the mouth of the pier in a similar manner and became a serious obstruction to navigation. Two years ago last October the steamer John N. Glidden in collision with the barge Manda was sunk near the lower end of the canal and blocked navigation for nearly two weeks, except for such ships of light draught as could use the old channel to the westward of the ship canal. Tugs and lighters have been sent to the Jenks and it is hoped she will be released in short order, although the chances for quick work are now the best, as the pressure of the entire current of St. Clair river, at this point about four miles an hour, is running broadside against the disabled steamer.

At the time the plans were made for the additional ship canal to the eastward of the present St. Clair Flats Ship Canal, there was a decided difference of opinion as to the manner in which it should be constructed. Some were in favor of the double channel system which meant the retention of the present west pier and revetment and a new canal to consist simply of a dredged channel to the eastward. This plan was adopted and is now well under way. Others were in favor of removing the west pier entirely and making a clear channel 650 ft. wide without obstruction, but the recommendation of the United States engineer in charge of the work in that district was against this plan. Had the latter plan been adopted, however, an accident such as that to the steamer Jenks would be impossible and in case a steamer should become disabled at this point it would simply drift down stream and out into Lake St. Clair if it avoided upbound boats.

FREIGHT SITUATION

Notwithstanding the extremely attractive rates on coal and grain, the wild ore rate remains the same as the contract rate, though single cargoes for small furnaces have probably been moved at better figures. Despite bad weather the ore movement has been good though some of the owners are still behind on contracts. The Steel Corporation is well entrenched with an abundant supply, though the exact figures are not given out. They are probably, however, between 18,000,000 and 19,000,000 tons. It has remained for the present season to prove how completely the ore trade dominates vessel tonnage. A number of owners, of course, would have preferred to transfer their vessels into the grain trade, but refrained from doing so for fear that the ore shipper might need them meanwhile. The ore shipper has unlimited future patronage to bestow, a circumstance of which vessel owners are very well aware.

Lake Erie docks will be in fairly good shape on Dec. 1, and it is not expected that the amount of ore on dock will be very much greater than it has been for several years past. The amount of ore on dock Dec. 1, 1902, was 7,074,254 tons; Dec. 1, 1903, 6,371,085 tons; Dec. 1, 1904, 5,763,399 tons. Until the latter part of September of the present year, ore was generally going directly into cars, but the railway companies later began to divert the cars to other service so that throughout October the docks were fairly incumbered with ore. There may be some difficulty in the prompt shipment of ore from dock to the furnaces during the coming winter, owing to the demand for cars elsewhere.

The coal rate to Lake Michigan is 75 cents and to Lake Superior 50 cents, with better figures obtaining for some of the smaller ports. Grain is 3 cents from Chicago and 4 cents from Duluth.

THE LARGEST FOREIGN COMMERCE

By Walter J. Ballard.

Considering its usefulness, compared with the age of its commercial rivals, the United States has reason to be proud of the growth of its foreign commerce. During the fiscal year just closed that commerce was the largest in the history of the nation—reaching $2,635,970,333, or an excess of $184,055,691 over 1904, the previous record year.

Our 1905 fiscal year foreign commerce consisted of:

Exports	$1,518,462,833
Imports	1,117,507,500

Giving us a favorable balance of trade of no less than $400,955,333, or a surplus equal to nearly ten times our total foreign commerce ($43,000,000) in 1790, our earliest record.

In no way is the history of a country more graphically portrayed than in the history of its foreign commerce. Here is the portrayal by bi-decennial periods and quoting, for easy reading, round millions of dollars only, from the exact record of our Bureau of Statistics:

	Imports.	Exports.
1790	$ 23,000,000	$ 20,000,000
1810	85,000,000	66,000,000
1830	62,000,000	71,000,000
1850	173,000,000	144,000,000
1870	435,000,000	302,000,000
1890	789,000,000	857,000,000
1900	849,000,000	1,394,000,000
1904	991,000,000	1,460,000,000
1905	1,117,000,000	1,518,462,833

What patriotic American, born or adopted, can look at that record without feeling proud that he belongs to a nation which does things? Except in three years, 1790 and 1810, formative years, and 1850, the year of our political regeneration, an unbroken record of success—of selling millions more than we buy. Since 1897 we can count that excess by hundreds of millions yearly, though each year we have bought many millions more.

What other country in the world can, or could, show an increase of $510,000,000 (1850-1870) in its foreign commerce in the last year of twenty years, with a gigantic civil war, lasting several years, in between, and leaving about one-third of the nation, and that part controlling one of its chief staples, cotton, to be entirely reconstructed? Again, what other nation in the world could suffer as we did, industrially, commercially and financially, in the years 1893-1896, and yet keep up its winning pace in foreign commerce as we did? In those years we did not achieve, by any means, such results as in the years since, but we held our grip in spite of everything and everybody, till the floodtide of prosperity poured in upon us again. The world expected broken down America to emerge from that trying period, instead of which it encountered a giant ready and armed for the fray. From that glad day in November, 1896, commercial victory has never left the American flag, and will never leave it while American business ability and American business activity are kept out the mire of petty, personal politics.

In connection with the proposal to construct a new ice-breaking steamer to be put on the winter route between Prince Edward island and the mainland, the department of marine sent for C. Duguid, of London, for consultation. It is not announced when contract for the steamer will be let.

CHICAGO GRAIN REPORT

Chicago, Nov. 14.—Shipping of the past week notes a continued light movement via lake despite the rates were established at 3 cents on corn, and, in most cases, charter contracts connecting despatching clauses, either in outright guarantee or the "port privilege" at destination. Thus far, however, the new basis has failed to attract any extra supply of vessel offering which is, of course, attributable to the uncertainty of lower elevator situation. Immediate reports indicate probability of a further pronounced congestion at Buffalo by reason of Northwestern receipts of last week. It may be expected that this obstacle will be more or less prominent for the remainder of season. Meanwhile there is considerable shipping out of Chicago in point of quantity. Receipts are noticeably in excess of the year ago, but in the outmovement railroads continue to hold the conspicuous position as evidenced in the comparative distribution. There was via all rail lines of flour 108,880 bbls.; wheat 138,221 bu.; corn 628,358 bu.; oats 1,786,170 bu., and barley 365,056 bu. Via lake to Buffalo and other American ports of flour 148,732 bbls.; wheat 455,000 bu. and corn 52,000 bu. And via lake to Canada points of flour 1,300 bbls. and corn 30,037 bu.

Lake and Rail Shipments.

	This Week	Last Week	Same Week last year
Wheat	594,221	307,207	583,826
Corn	710,645	535,903	871,106
Oats	1,786,170	2,140,053	1,101,050
Rye	23,130	21,530	239,630
Barley	365,056	629,382	195,059
Total	3,479,222	3,634,075	2,991,571
Flour	258,883 (Bbls.)	222,454	129,054

	Shipments since Jan. 1, 1905.	Same Week last year
Wheat	11,796,828	14,877,130
Corn	82,026,626	64,891,452
Oats	53,443,941	41,751,796
Rye	1,002,694	1,352,698
Barley	5,222,837	4,520,388
	153,492,026	127,393,464
Flour	6,216,672 (Bbls.)	6,327,296

	This Week	Last Week	Same Week last year
Wheat	7,495,000	7,205,000	4,221,000
Corn	1,235,000	931,000	576,000
Oats	13,739,000	13,488,000	9,329,000
Rye	461,000	463,000	446,000
Barley	395,000	330,000	210,000

LAUNCH OF THE STEAMER BIXBY

The new steel steamer W. K. Bixby, constructed at the Wyandotte yard of the American Ship Building Co., was successfully launched on Wednesday afternoon this week. Mrs. Hugh McMillan acted as sponsor for the ship, which will be operated by the National Steamship Co. of Detroit. The Bixby will go into commission at the opening of navigation next year. Her dimensions are 500 ft. over all, 480 ft. keel, 52 ft. beam and 30 ft. deep. She is of the arch construction with straight hopper sides, has fourteen hatches spaced 24 ft. centers, and is equipped with triple expansion engines with cylinder dimensions 22½, 36, 60 by 42 in. stroke. Scotch boilers are 13.9 by 11.6, with a working pressure of 180 lbs. The Bixby will be equipped with Howden forced draft.

The steamer Rochester of the Union Steamboat Line was ashore this week at Seul Choix Point at the foot of Lake Michigan on the west shore. Wrecking tugs from Cheboygan and Escanaba have gone to the steamer which has a cargo of package freight.

CANADIAN PACIFIC COAL DOCKS

On the front page of the Marine Review of this issue is an illustration showing the steamer Philip Minch and Anna C. Minch, at the Canadian Pacific coal dock, Fort William, Ont. These two boats had cargoes representing 15,300 tons, which was transferred from the boats to storage on the dock in the actual working time of forty-three hours with one-ton Macbeth rigs. This coal dock is one of the most complete on the lakes, and has established several records for fast handling of coal. The yard is 1,100 ft. along the front of the Kaministikwia river, 275 ft. back, and 30 ft. deep from the top of the car loading bins.

The storage capacity is about 200,000 tons. For distributing coal in the storage, the dock is equipped with two traveling bridges, and with cable cars which have a capacity of about 600 tons an hour, that is from the towers on the face of the dock to the yard. The bridges are also fitted out with pick-up machines with a capacity of about 1,800 tons in ten hours, taking coal from storage, putting it into pockets from which the coal is loaded into cars. The hard coal storage shed has a capacity of 50,000 tons and a pick-up machine with a capacity of sixty-five to seventy tons an hour. The dock is one of the most modern on the lakes, and is equipped with the cable system for shifting cars in front of and away from the chutes and also for moving the towers into which the unloading rigs operate into a pocket, and then into cars for distribution over the storage pile. During the past season this dock handled approximately 800,000 tons of coal. N. N. Jockeland is superintendent of the dock, which is situated very conveniently near the mouth of the piers leading into Fort William, and vessels consigned to it can go directly to the dock from Thunder bay without making a turn.

THE GROWTH OF CORPORATIONS

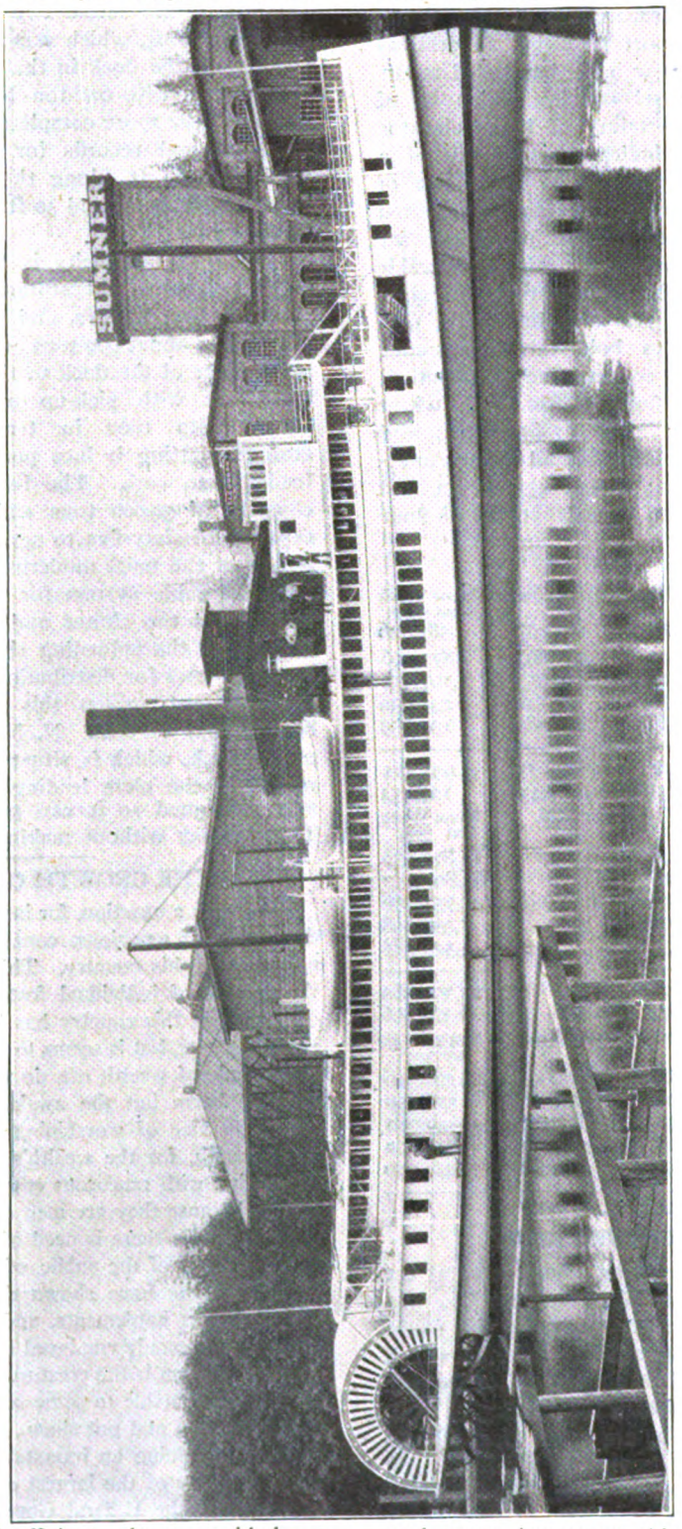
Take such a question, for instance, as the question, or rather the group of questions, connected with the growth of corporations in this country. This growth has meant, of course, the growth of individual fortunes. Undoubtedly the growth of wealth in this country has had some very unfortunate accompaniments, but is seems to me that much the worst damage that people of wealth can do the rest of us is not any actual physical harm but the awakening in our breasts of either the mean vice of worshiping mere wealth, and the man of mere wealth, for the wealth's sake, or the equally mean vice of viewing with rancorous envy and hatred the men of wealth merely because they are men of wealth.

Undoubtedly there is need of regulation by the Government, in the interest of the public, of these great corporations which in modern life have shown themselves to be the most efficient business implements, and which are, therefore, the implements commonly employed by the owners of large fortunes. The corporation is the creature of the State. It should always be held accountable to some sovereign, and this accountability should be real and not sham. Therefore, in my judgment all corporations doing an interstate business, and this means the great majority of the largest corporations, should be held accountable to the Federal Government, because their accountability should be co-extensive with their field of action. But most certainly we should not strive to prevent or limit corporate activity. We should strive to secure such effective supervision over it, such power of regulation over it, as to enable us to guarantee that its activity will be exercised only in ways beneficial to the public.—[From the President's speech at Atlanta.

The Wellman-Seaver-Morgan Co., of Cleveland, have been awarded a contract for the new crane for the Mare Island navy yard, the price to be $83,000.

STEAMER TELEGRAPH

The steamer Telegraph, an illustration of which is herewith given, was recently built for the Seattle, Everett & Tacoma Navigation Co., and is 165 ft. long, 26 ft. beam and 9 ft. deep, and draws 6 ft. of water. As noted, she is of the stern-wheel type and is said to be quite fast. The engines are 24-in. cylinder and 6-ft. stroke, and are equipped with Gillett's patent balanced valve variable cut-off valve gear. The entire lower deck is covered with linoleum. The cabins are finished in mahogany and native cedar. It is understood that the Telegraph has beaten the steamer Flyer, one of the crack boats on Puget Sound.



NEW STEAMER TELEGRAPH, BUILT AT SEATTLE.

THE ENGINEER IN THE NAVY

A society lady of New York attended a reception held in connection with a meeting of the American Society of Mechanical Engineers, and expressed her surprise at finding them "so intelligent and well dressed a body of men."

We mention this as an index of the popular conception of the engineer. Imagine the paymaster the surgeon, the chaplain and the chief engineer of a man-of-war ashore together. Which would receive the most consideration? Which would the average citizen consider the superior in official and social importance? Would not the average man wonder, if he thought of it at all, how the poor devil of an engineer ever happened to get into such distinguished company?

The surgeon looks after the hygienic condition of the ship, and in time of war renders such assistance to the ship as the condition of the wounded will permit. If he were inefficient, there would be a moderate increase of mortality in the crew. If the engineers of the Oregon had been inefficient she never would have made her famous run around the continent, and the lack of efficiency in the engineering department of the Bennington killed and injured more men in four seconds than a worthless surgeon could let die in four years, to say nothing of the injury to the vessel and the prestige of the navy. The surgeons receive salaries which range from $2,800 to $4,200 a year.

Paymaster is the chief disbursing officer of the vessel, the treasurer, so to speak. His is a mere clerical position, requiring no large degree of commercial ability, or training, and commanding the same pay as the surgeon.

Opinions may differ as to the effect of the presence or absence of the chaplain on the efficiency of the vessel, but if either he or the engineer had to go, there can be no question as to which it would be. They are paid from $2,500 to $2,800 a year.

The surgeons and paymasters have the relative rank of commander, the chaplain that of lieutenant of the junior grade, with the accompanying gold-lace insigna and social and other prerogatives.

And the engineer, who is responsible for the mechanical efficiency of the vessel, whose department comprises some 40 per cent of the personnel, is nothing but a warrant machinist, with no rank and no privileges, not entitled even to a humble corner of the officers' mess, has to make way in the assignment of quarters for the boatswains, gunners and carpenters and he gets from $1,200 to $1,800 a year.

In the North German Lloyd steamers the man who stands next to the captain, not only in pecuniary remuneration but in recognition and consideration, is the chief engineer. The captain sits at the head of the principal table in the saloon, but at the head of the next table sits the chief engineer and his quarters are such as to inculcate self-respect and respect for him on the part of his subordinates. Further, and more important, his authority is supreme in his own department. He is held strictly responsible for results, but allowed to effect them in his own way.

Up to the passage of the navy personnel bill, in 1899, there were chief engineers in the navy. They came from the same class socially as the members of the line, obtained their admission to the naval academy at Annapolis in the same way, and after passing the same examinations and meeting the same requirements. Only after

their admission to the academy were they required to choose between the staff and the line and to specialize for their chosen branch. They were just as well born, brought up amid as refined surroundings, subjected to as rigorous a technical training as their fellow-students, but they were of the staff, they were not fighting men, they had not behind them the glorious traditions of the old navy when the steam engine was not yet, nor before them the hope of becoming Paul Joneses, Perrys and Farraguts. Their rank, although that of captain or commander, was only relative. They were snubbed and treated as an inferior order of being by their former classmates, who did not seem to see how a greasy mechanic could be admitted on terms of equality to the select circle of the successors of that Paul Jones who wrote: "It is by no means enough that an officer of the navy should be a capable mariner. He must be that, of course, but also a great deal more. He should be as well a gentleman of liberal education, refined manners, punctilious courtesy and the nicest sense of personal honor."

They were compelled to take orders from men inferior in rank and training, simply because they were of the line, and their authority in their own department was made to yield to the whim of a petty officer of the deck.

This state of affairs could not last, and the agitation of the engineers for actual rank and authority resulted in the abandonment of the specialization for engineers. Just as all officers were supposed to be competent mariners in the days of sails, all officers are now supposed to be competent engineers, and to take their watch in the engine-room. Such watch is merely perfunctory, or at best supervisory. The engineer officer is regarded as a joke by the men with real practical experience and who really know what to do to keep the ship running, and the real engineer is reduced to an official nonentity with no rank, inferior pay, no authority nor social standing, no part in the organization and traditions of the navy, and no anticipation of official recognition and advancement. Officially he is like an army mule, without pride of ancestry or hope of posterity.

The achievements of a navy depend upon the military genius of its commanders; its efficiency depends upon its engineers. The qualities of the two classes of men are essentially different and must be the result of different training. The selection of ambitious youth will naturally run to the line, with its prospects of glory and command; but the engineering service can be made attractive enough to engage the ambition of a sufficient number of capable men if it is given anything like its relative importance. The engineer is still suffering by the mistaken popular estimate of his status instanced in our opening paragraph. When the world learns what an engineer is, the title "Chief Engineer U. S. N." will carry as much distinction with it as any other title below that of captain, and when the actual engineer of a vessel of war receives recognition and authority and emolument commensurate with his importance, there will be no lack of material with which to organize a service upon that high plane of efficiency which the American citizen expects his navy to maintain, the members of which will meet the high ideal of our first admiral as to the requirements of a naval officer.

It has been urged in extenuation of the state of affairs found to exist on the Bennington that there are not nearly enough officers in the navy available for doing engineering duty. As long ago as September, 1896, we said: "The number of engineers must be increased and the conditions of their service must be so improved as to attract and retain desirable engineering talent. Gunboats are no longer sailboats and you cannot run the present aggregation of steam machinery with gold braid and brass buttons. Let the line sacrifice a little of its prestige to the efficiency of the service. Times have changed."

And again, in December, 1897: "A conference has been held by a board consisting of seven line officers and four engineer officers, presided over by Assistant Secretary of the Navy Roosevelt, to endeavor to conciliate the differences which have existed for years between the engineer corps and the line. From the public reports of their conclusions, they appear to have sacrificed the efficiency of the service to peace and good-fellowship in the ward room. The line has taken the engineer corps unto itself. The engineer officers will hereafter, if the plan carries, be required to do line duty, and will acquire the long-coveted actual rank and title. The line officers will also be required to do engineering duty to the end that every officer upon the ship may be able to serve either upon the bridge or in the engine-room. In order that the engineering duties may not be too onerous for this hermaphrodite functionary, it is proposed that the 'machinists' who are enlisted men 'shall have more to do with running the engines!' This seems to be a case of the lion lying down with the lamb—inside of him. The line has always maintained that the actual care and operation of the engines required only practical mechanics, and that they could do what 'bossing' was needed.

" 'Success lies in limitation.' Efficiency comes from specialization. Perry and Farragut labored and shone in an altogether different field from Ericsson and Isherwood. The engineering of a man-of-war is a department of itself. It should be made to include and control the care and operation of all of the machinery in the vessel. . . . The chief engineer should have absolute authority in his department, should be responsible only to the commanding officer or his direct representative, and not subject to annoyance nor interference from petty officers of the line. The number of engineer officers should be increased to meet the demand of the more numerous, more powerful, and more complicated vessels which the navy is acquiring, and the officers of the engineering department should have a positive and well-defined standing as regards rank and priority in keeping with the importance and responsibilities of their position. They are not, as it is often made to appear, men from civil life employed to assist in operating the vessel, but a part of a military organization matriculated from the same institution as the officers of the line, and their course is no less difficult, the requirements no less severe. They do not, as we understand it, wish to be known as that which they are not. To be chief engineer of a man-of-war is a position of responsibility and importance. To be known and recognized as the chief engineer is honor enough among those who understand the requirements of the office. It is a position to be proud of, not to be hidden under a meaningless title. But what is the position of the chief engineer relatively to the other officers? Some of them have the relative rank of captain, others of commander, lieutenant-commander, etc.; but this does not mean that they have an authority even in their departments commensurate with those titles, or that they assume among the other members of the personnel positions in accordance with their relative rank."—[Power.

The Harlan & Hollingsworth Co., Wilmington, Del., will erect a power house at its plant to cost $10,000.

The Fore River Ship Building Co., Quincy, Mass., has completed a large addition to its pattern and joiner shop and is now installing new tools and equipment.

WHO SUBSIDIZES FOREIGN STEAMSHIP COMPANIES

Editor *Marine Review*:—In a speech made by Mr. Emil L. Boas, manager of the Hamburg-American Line at the inspection ceremonies on board the steamship Amerika a few days ago, he is quoted as saying that the Hamburg-American Line (with its fifty different services to all parts of the globe) has been built up without the aid of government subsidy. The following figures (approximate) will in a measure explain who is paying foreign steamship subsidies, and will also explain the reason why foreign steamship builders and foreign steamship companies have been led to believe that the art of building and operating ships has been handed down to them by NOAH and belongs to them by Divine right.

Amount spent annually by Americans in foreign travel (developing European winter and summer resorts)	$150,000,000
Amount spent annually by Americans for import freightage	50,000,000
Amount of interest and earnings of foreign capital in this country	100,000,000
Amount of American funds invested in foreign securities	125,000,000
Amount in credits permitted to stand abroad	100,000,000
Total amount spent annually by Americans for subsidizing foreign steamship companies, developing European winter and summer resorts, sustaining foreign standing armies and navies	$525,000,000

The above is exclusive of the amount of our foreign indebtedness actually cancelled by the return of securities (of which data is lacking) and also amounts running up into millions, spent by title-seeking Americans, which also must be considered in above total.

In view of the above, is it then any wonder that the recent utterances of Prof. Francis Greenwood Peabody, of Harvard university on "Reciprocity" made before a distinguished body of German government officials (including the Kaiser) received the plaudits of the German emperor and the unanimous commendation of the officials in question. Also if the time is not now ripe for the final consideration of some policy and action, which will enable this great country, with its almost boundless coast-line to again regain her proud title of "Mistress of the Seas."

New York, Nov. 4, 1905. JOHN B. HARDY.

CONDITION OF THE ISTHMIAN CANAL

The *Times-Democrat* of New Orleans has published an interview with Major B. M. Harrod, of the Isthmian Canal Commission, which is particularly interesting from the fact that the gentleman granting it is the only Commissioner who has held office continuously since the beginning of the work. Consequently, he is unusually well qualified to judge of the progress and prospects of affairs on the Isthmus. The interview reads as follows:

Major Harrod reported that, since his former visit to the Isthmus, on July 8, there has been a marked change for the better in the situation there. The accommodations for skilled labor have been vastly improved, and the American colony of wage earners appears satisfied with existing conditions. The government has built commodious houses for men of family, and hotels to the number of seven for single men, where good fare and comfortable lodging are furnished them. This improvement has had a fine effect upon the morale of the men, and a feeling of content has succeeded the former demoralization.

American labor, mostly confined to the skilled variety, is paid in gold or its equivalent in United States currency. Native labor, canal diggers and others of the lowest paid class receive their wages in the current silver coin of the Republic of Panama, which is worth 50 cents on the dollar of our money. The labor question has been satisfactorily solved by the employment of natives of Panama and the islands of the Carribbean Sea, notably Barbados, Martinique, Colombia and Jamaica. This class of labor is available in countless numbers, and there will be no necessity, as was once thought, for the importation of coolie or other Asiatic labor. They are paid 17 cents an hour in silver, are inured to the climate, and though not very efficient, will serve the purpose of the commission. There are about 13,000 men now employed by the commission, of which number about 10,000 are natives. Major Harrod does not think there will be occasion for more than 20,000 or 25,000 men, and they are coming of their own accord from neighboring islands in such numbers as to threaten an oversupply.

The progress of the work, said Major Harrod, since his previous visit there in July, has been mainly of a preliminary character. There has been some excavating done, but the bulk of the work thus far has been to provide suitable quarters for the men and establish a good system of food supply and cold storage facilities. Much time has also been spent double tracking the railroad, building switches for dumps and otherwise getting ready for the great work.

When Major Harrod left there, Oct. 11, there was but one case of yellow fever on the Isthmus, and, with that exception, there had been no cases for a period of thirty days. In fact, the American Sanitary Commission is offering a reward of $50 for any authenticated case of yellow fever that may be discovered.

The sanitary conditions of the Isthmus have been brought to a very satisfactory state under the direction of the United States authorities. A new system of waterworks has been installed in Panama, furnishing an abundant supply of pure water from the headwaters of the Rio Grande, about fourteen miles distant. A sewerage system is approaching completion and street paving is well under way. At Colon also a waterworks system has been installed furnishing excellent water from the Brazos river. Good water has long been a desideratum on the Isthmus and its absence greatly enhanced its former unhealthy condition. Now that this defect has been remedied, there is no reason why Panama should not be redeemed from its unfavorable reputation with respect to health conditions.

Major Harrod was naturally not inclined to discuss the relative merits of the lock or sea level systems of canal construction, as that question is now being considered by higher authorities. The advisory board met in Washington on Sept. 1, and was placed in possession of all information gathered by the Panama Canal Commission. All facts and plans were laid before them in detail, coupled with an invitation to visit the Isthmus. The advisory board accepted the invitation, and spent eight days on the Isthmus, making a thorough examination of its topography, hydrography and physics. They then came back to enter upon the preparation of their report, which Major Harrod expects will be ready in November for presentation to the commission. The commission will then transmit the report to the President of the United States and all the documents will probably come before Congress when it meets in December.

Asked as to when the canal would probably be completed, Major Harrod referred the reporter to the report of the "Commission Technique," appointed by the new Panama Canal Co., a French corporation, or to the report of the United States Commission of 1901, which reports estimated the time necessary to complete the canal at seven or eight years. Those plans were submitted to the present Panama Commission together with plans prepared by outside parties, and all of them are before the advisory board for rejection, modification or acceptance.

"There is complete harmony now," Said Major Harrod, "between the chairman of the commission and its members.

The executive committee confines itself to the business end of the work, and the engineers to the practical part of it."

"There has been some doubt expressed," said the reporter, "as to the practicability of building a canal across Panama. Is that doubt well founded?"

"Emphatically not," replied Major Harrod. "There is no doubt whatever as to the thorough practicability of building the canal across the Isthmus chosen for it."

SUMMARY OF NAVAL CONSTRUCTION

The monthly summary of construction of naval vessels shows considerable progress in all the ship yards. The Connecticut, building at the New York navy yard, is given as being 91.30 per cent completed as against 89.25 per cent for the sister ship Louisiana. Following is the summary:

Name of Vessel.	Building at	Percent Completion Oct. 1	Nov. 1, 1905.
	BATTLESHIPS.		
Virginia	Newport News S. B. Co....	94.24	95.31
Nebraska	Moran Bros. Co.....	81.	82.
Georgia	Bath Iron Works.....	87.44	89.
New Jersey	Fore River S. B. Co.....	90.1	92.1
Rhode Island	Fore River S. B. Co.....	93.7	95.
Connecticut	Navy Yard, New York.....	89.39	91.30
Louisiana	Newport News S. B. Co.....	87.73	89.25
Vermont	Fore River S. B. Co.....	63.8	65.8
Kansas	New York S. B. Co.....	62.7	64.9
Minnesota	Newport News S. B. Co...	73.86	75.41
Mississippi	Wm. Cramp & Sons.....	40.87	43.31
Idaho	Wm. Cramp & Sons.....	36.22	39 19
New Hampshire	New York S. B. Co.....	20.4	25.
	ARMORED CRUISERS.		
California	Union Iron Works.....	82.9	84.3
South Dakota	Union Iron Works.....	81.9	83.2
Tennessee	Wm. Cramp & Sons.....	86.08	87.80
Washington	New York S. B. Co.....	85.8	87.9
North Carolina	Newport News S. B. Co.....	19.20	23.13
Montana	Newport News S. B. Co.....	16.81	19.21
	PROTECTED CRUISERS.		
St. Louis	Neafie & Levy S. B. Co.....	79.69	81.28
Milwaukee	Union Iron Works.....	82.	84.01
Charleston	Newport News S. B. Co...	99.8	99.9
	TRAINING SHIPS.		
Cumberland	Navy Yard, Boston.....	95.	95.
Intrepid	Navy Yard, Mare Island..	97.5	97.5
	SCOUT CRUISERS.		
Chester	Bath Iron Works.....	6.11	9.
Birmingham	Fore River S. B. Co.....	9.3	12.6
Salem	Fore River S. B. Co.....	8.2	12.3
	TORPEDO BOATS.		
Goldsborough	Wolff & Zwicker.....	99.	99.
O'Brien	Lewis & Nixon.....	99.	99.
	SUBMARINE TORPEDO BOATS.		
Submarine T. B. No. 9.	Fore River S. B. Co...	25.4	30.6
Submarine T. B. No. 10.	Fore River S. B. Co...	21.1	29.
Submarine T. B. No. 11.	Fore River S. B. Co...	23.6	29.3
Submarine T. B. No. 12.	Fore River S. B. Co...	23.1	25.

INTERNATIONAL WATERWAYS COMMISSION

The International Waterways Commission held a meeting at Buffalo last week to discuss the power canal conditions at the Sault. President Livingstone of the Lake Carriers' Association and Harvey D. Goulder, counsel, appeared before the commission to urge the safeguarding of the rights of navigation. They spoke against the granting of any additional power franchises at the Sault. The representatives of the power companies present claimed that the development of the enterprise would never be a detriment to lake commerce. General Oswald H. Ernst, chairman of the committee, asserted that it was the determination of the commission to preserve the interests of navigation regardless of any private corporation.

The commission adopted the following resolution:

"Resolved, That in the opinion of this Commission no further rights or privileges should be granted or conferred regarding the uses or diversions of the water flowing out of Lake Superior, by either the Government of the United States or Canada, until all data and information are in the hands of the Commission that may be necessary to enable it to make suggestions for regulating the excess of these waters, or that if such rights or privileges be granted they be subject to any regulations that may be adopted by both governments."

BIDS FOR NAVY YARD EQUIPMENT

Washington, Nov. 14.—The bureau of supplies and accounts, of the navy department, last week open bids for several important items of equipment: For one 2-ton, 3-motor overhead electric traveling crane for the Puget Sound navy yard, the proposals were as follows: Alliance Machine Co., Alliance, Ohio, $2,355; Brown Hoisting Machinery Co., Cleveland, Ohio, $1,597; Case Manufacturing Co., Columbus, Ohio, $1,975; Cleveland Crane & Car Co., Wickliffe, Ohio, $1,690; Niles, Bement, Pond Co., New York city, $2,070; North Penn Iron Works, Philadelphia, Pa., $1,706; Pawling & Harnischfeger, Milwaukee, Wis., $2,100; Tatum & Bowen, San Francisco, Cal., $1,175.

For two 2-motor electric traveling hoists, single hook, each having a capacity of 6,000 lb., the bids offered were as follows: Alliance Machine Co., Alliance, Ohio, $2,500; Cleveland Crane & Car Co., Wickliffe, Ohio, $1,900; Niles, Bement, Pond Co., New York city, $2,075; Pawling & Harnischfeger, Milwaukee, Wis., $1,760; Tatum & Bowen, San Francisco, Cal., $2,066; Yale & Towne Manufacturing Co., New York city, $1,612.

For two complete sets of diving apparatus to be delivered at the Boston navy yard, two proposals were submitted as follows: Andrew J. Morse & Son, New York city, $2,088; A. Schrader's Sons, New York city, $2,120.

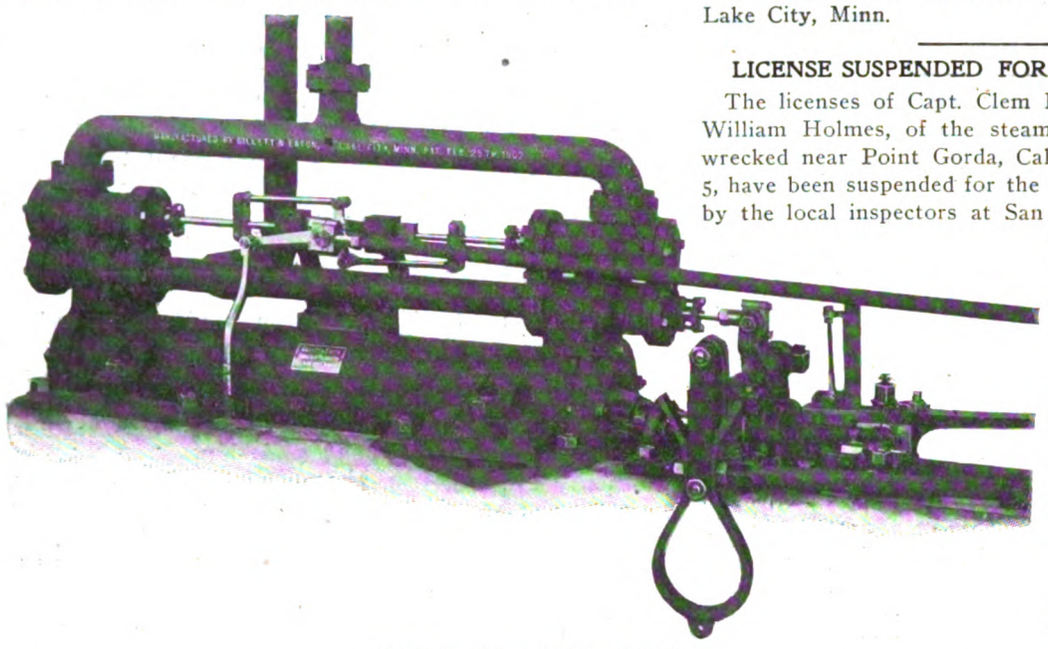
The navy department has decided to reject all bids for the floating derrick for the new naval station at Guantanamo, Cuba, and the work will be done by the purchase of material and the hire of labor.

The schooners B. W. Parker and Nellie Mason, which struck the west arm of the Cleveland breakwater on Monday night and sank, are total losses and have been abandoned by the owners. The schooners were almost completely demolished by the storm. They were in tow of the steamer Lansing at the time, but the Lansing was unable to make the harbor in the gale, and was compelled to drop her consorts.

In 1903 the Midland Railway Co. built four screw steamers for its Irish and Isle of Man services. Two of the steamers were equipped with reciprocating engines and two with steam turbines. From September, 1904, to and including June, 1905, the performances of the different installations were carefully noted, with the result that, generally speaking, the turbine steamers have been greatly superior to the others, both as regards economy of water, coal and oil consumption, cost of keep, elimination of vibration and saving in weight. It was found that at from 14 to 20 knots the turbine was the more economical, as regards water consumption, the maximum difference occurring between 19 and 20 knots. There was a marked decrease in coal consumption of the turbine steamer at 19.5 knots also.

GILLETT'S BALANCED VALVE VARIABLE CUT-OFF STEAMBOAT ENGINES

The accompanying illustrations represent Gillett's balanced valve variable cut-off steamboat engines, for stern and side wheel boats. The important feature of these engines is the valve gear, which handles the steam very near the theoretical ideal, resulting in an economy and general efficiency not usually attained in this class of engines.



BALANCE SLIDE VALVE ENGINE.

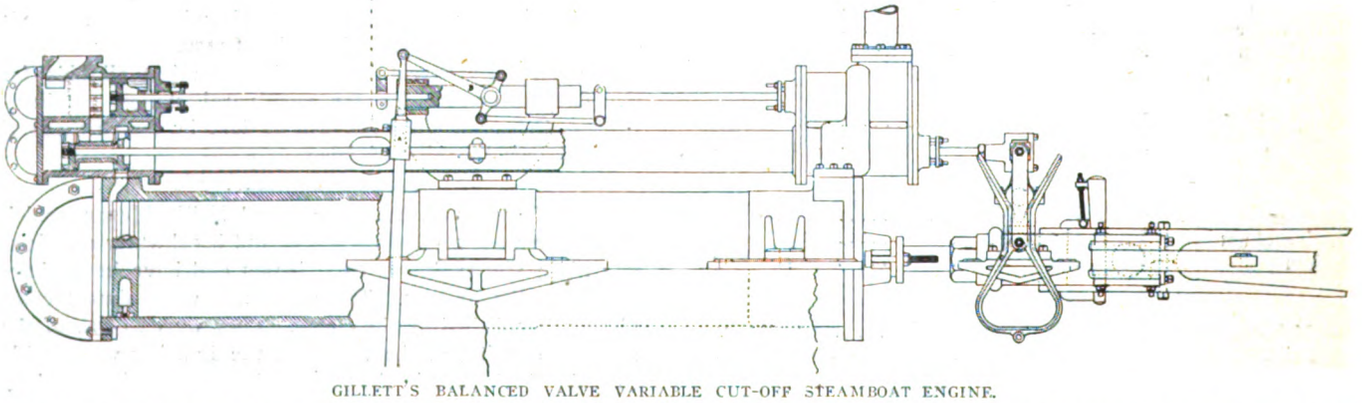
As will be seen by the cuts, the valve chambers which are situated at each end of the cylinder, contain two balanced piston valves, one above the other. The upper, is the cut-off and the lower the main valve. These valves are fitted with steam tight packing rings, the chambers are accurately bored and the ports over which the valves pass are bridged on the diagonal, thus equalizing the wear on the rings. Steel castings are used in a number of important places.

The point of cut-off is varied by the movement of the spreader arms between the valve chambers. These spreader arms are connected indirectly by levers and rods, to a quadrant on the deck, conveniently located, where the point of cut-off may be varied at will, from nothing to full stroke. The reversing of the engine is accomplished by the use of reverse hooks as shown in the cuts or links. The cut-off working the same backing as going ahead.

When it is desired by the purchaser, the engines can be furnished with the valve gear operated entirely from the inside of the boat, thus doing away with eccentrics or cams or any connections with the wheel shaft, whatever.

Regarding the adaptability of the balanced piston valve to this class of engines, it can be stated that they are as good a valve for the high pressures used in this class of work as has yet been produced.

The engines are manufactured by Gillett & Eaton, of Lake City, Minn.



GILLETT'S BALANCED VALVE VARIABLE CUT-OFF STEAMBOAT ENGINE.

LICENSE SUSPENDED FOR EIGHTEEN MONTHS

The licenses of Capt. Clem Randall, and Second Mate William Holmes, of the steamship St. Paul, which was wrecked near Point Gorda, Cal., on the morning of Oct. 5, have been suspended for the period of eighteen months by the local inspectors at San Francisco. Capt. Randall is blamed for shaping a course that would take the vessel so near Point Gorda, and for trusting to the ship keeping clear of the land because the same course had been taken by her before. He is also deemed culpable because he relied on the judgment of Mate Holmes, who had charge of the watch.

Mate Holmes was found negligent in not being more vigilant and in not changing the vessel's course as he must have known that she was getting near the land; and in not keeping a better lookout for the shore. It was shown that there was a smooth sea and a light wind, and that there was no good reason why the St. Paul should have been wrecked and that the only reason for her loss was unskillfulness and negligence on the part of Capt. Randall and Mate Holmes. Neither will be allowed to take charge of any vessel for one year and a half.

The St. Paul was of 2,240 tons, and had on board at the time of the disaster 104 passengers all of whom were safely landed. The steamship was valued at $234,000 and the cargo at $166,000 both of which proved a total loss.

The Pittsburg Steamship Co., has given the Delaware Marine Supply Mfg. Co., an order to fit all of its fleet, which comprises 112 vessels, with one-snap air ports.

A new chart in colors of Sheboygan Harbor, Wis., has just been issued by the United States Lake Survey Office and is now for sale by the *Marine Review*.

NEW STEAMER FOR R. & O. CO.

The Richelieu & Ontario Navigation Co. has confirmed the report through General Manager Smith that a new steamer for the rapids section of "Niagara-to-the-Sea" would soon be constructed. A contract for the boat will be closed shortly. The new steamer will be 230 ft. long, 44 ft. beam over the guards, and will have a carrying capacity of 1,000 passengers. She will be built especially for the service. A great deal of attention has been given to the plans by the directors of the company, aided by their own and outside experts in marine architecture.

Beside the down-river traffic, the west-bound business has been carefully considered, with the result that the latest addition to the Richelieu & Ontario fleet will have 100 spacious staterooms. The plans also indicate that particular attention will be given to the dining room and kitchen arrangements of the new steamer. When the plans were being prepared it was decided to locate the dining room in the main deck aft, thus providing for large observation windows similar to these so much admired by the travelers on board the company's new steamer Montreal during the past season. The steamer will most likely be ready for service before the end of next season. Mr. Smith said that the company intended to go ahead with the construction of another new steamer for the Montreal and Quebec route. Specifications have already been prepared for a sister ship of the Montreal, and they are now being considered. It is expected that the vessel will be under contract in time to have her ready for the season of 1907. The general manager announced that she would be called the Quebec, and as soon as completed the present steamer of that name will no doubt be recalled, renamed and placed on another route. The new Quebec will be larger than her sister ship, the Montreal.

It is quite likely that the Quebec's hull and machinery will be constructed by contract, while her upper works and decorations will be completed at the Richelieu & Ontario's works at Sorel.

This does not end the plans of the company as far as construction is concerned. They are also figuring on a new steamer for the Montreal-Hamilton line. These steamers follow the Canadian channel, stopping at all ports and going through the Bay of Quinte, and it is the company's intention to have the new boat a different type from those already in the line. While her passenger accommodation will receive special consideration, she will have an increased carrying capacity and the most modern equipment for handling freight expeditiously.

THE STEAMBOAT "DOCTOR"

In marine work there is nothing more important in the machinery line, than the selection of a reliable boiler feed pump. The accompanying illustration represents a typical river boat, boiler feed pump, known as the "Doctor."

This style of pump is a great favorite among marine engineers, it is very reliable, having been designed especially for river boat service.

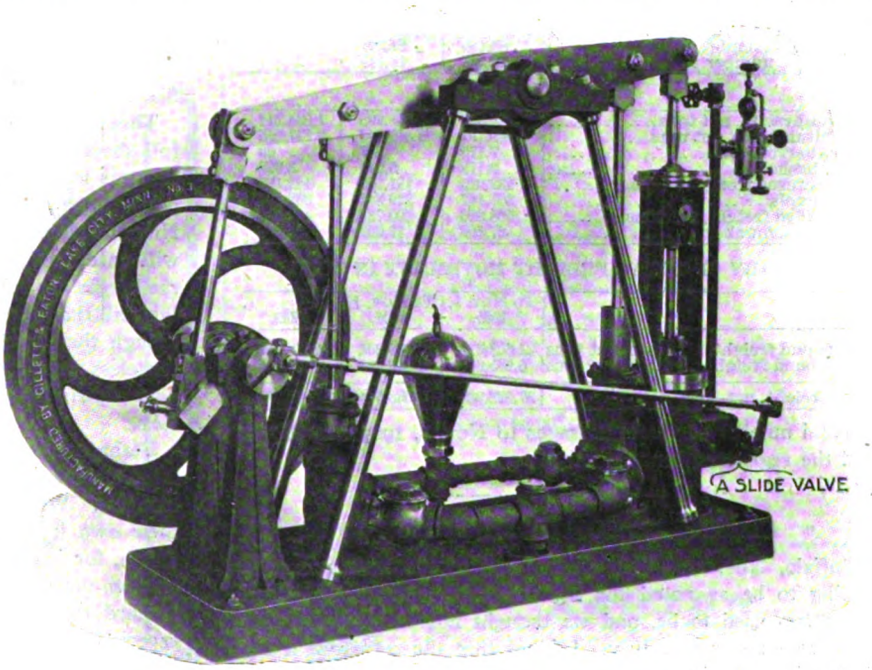
The plungers are vertical and outside packed, the valves being the well known Jenkins Bros., renewable seat type and their proximity to the pump cylinders all go to make this an ideal pump for feeding boilers on river steamboats. The neat and appropriate appearance is an item that should not be overlooked. This "Doctor" is manufactured by Gillett & Eaton, Lake City, Minn.

SUGGESTED NAVAL PROGRAM

Battleships and torpedo vessels are the immediate requirements of the navy in the opinion of the general board of which Admiral Dewey is president. In a recommendation just made to Secretary Bonaparte, which it is expected the secretary will incorporate in his annual report, the general board advocates the authorization by congress this winter of three battleships and sixteen torpedo vessels.

The battleships recommended would have a displacement of at least 18,000 tons, sufficient to enable them to carry ten 12-in. rifles, representing a radical departure from anything in the battleship line heretofore constructed by any nation. Of the torpedo vessels six would be destroyers, six ordinary torpedo boats, and four submarines.

Recent battleship construction in our navy has represented a steady progression of the intermediate battery from 5-in. quick-firing rifles to 6-in. on the Wisconsin class, and even 7-in. on some of the later ships. This progression has reached the limit of its development. The next step involves a radical innovation. It is nothing less than the abolition of the intermediate battery, and the putting of the weight thus saved into the fighting strength of the ship. This will be accomplished by increasing as far as possible the number of 12-in. guns in the main battery, and dropping the secondary battery to 3-in rifles at the largest.



"DOCTOR" STEAMBOAT FEED PUMP.

The steamer R. J. Hackett burned on Green Bay Sunday morning and sank on Whaleback shore. The crew did all they could to subdue the fire, but finally were forced to abandon the craft. The Hackett was 211 ft. long and was built in Cleveland in 1869. She was one of the celebrated boats on the lakes at the time.

COMMERCE OF SAULT STE. MARIE CANAL

The monthly statement of the commerce of the Sault Ste. Marie canals shows that 6,046,187 tons of freight were transported through the canal during October, being the heaviest movement of any October since the canals were opened and heavier than the movement of any month of any year prior to the present year. Up to Nov. 1, 37,993,930 tons were transported through the canal, surpassing by over 2,000,000 tons the total commerce of the year of 1902, which up to the present was the record-breaking year in the history of the canals. The total commerce for the present year will safely pass the 40,000,000 ton mark. Following is the summary of the principal items of freight moved through the canals to Nov. 1 with comparative statements for the two preceding years.

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

Items	To Nov. 1, 1905	To Nov. 1, 1904	To Nov. 1, 1903
Coal, anthracite, net tons	749,322	818,998	1,034,211
Coal, bituminous, net tons	4,849,791	3,818,694	5,197,255
Iron ore, net tons	27,852,943	16,134,123	20,538,577
Wheat, bushels	38,697,247	29,426,456	41,456,892
Flour, barrels	3,962,580	3,212,596	5,446,037

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO NOV. 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

Items.	To Nov. 1, 1905.	To Nov. 1, 1904.	To Nov. 1, 1903.
Copper, net tons	86,414	83,417	91,658
Grain, other than wheat, bushels	25,758,292	20,179,276	20,223,381
Building stone, net tons	8,649	25,611	14,790
Flour, barrels	3,962,580	3,212,309	5,445,977
Iron ore, net tons	27,852,943	16,134,123	20,538,577
Iron, pig, net tons	50,033	36,744	20,716
Lumber, M. ft. B. M.	828,470	782,710	857,325
Silver ore, net tons	41	1,313	.....
Wheat, bushels	38,697,247	29,426,456	41,456,892
Unclassified freight, net tons	83,189	81,324	81,936
Passengers, number	25,297	18,815	27,671

WEST BOUND

Coal, anthracite, net tons	749,322	818,998	1,034,211
Coal, bituminous, net tons	4,849,791	3,818,694	5,197,255
Flour, barrels	7,175	287	60
Grain, bushels	3,178	5,541	3,998
Manufactured iron, net tons	132,925	151,768	142,105
Salt, barrels	357,147	329,882	362,407
Unclassified freight, net tons	598,686	490,783	462,333
Passengers, number	27,500	17,602	26,686

SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Nov. 1, 1905.	To Nov. 1, 1904.	To 1903.
East bound freight, all kinds, net tons	31,608,316	19,333,202	24,474,555
West bound freight all kinds, net tons	6,385,614	6,330,339	6,895,230
Total freight, net tons	37,993,930	25,663,541	31,369,785

Total number of vessel passages to Nov. 1, 1905 was 18,752, and the registered tonnage 31,556,029.

CLOSING SEASON OF BIG FREIGHTS

Buffalo, Nov. 14.—This closing end of the lake season is getting to be as noted for big freights as seasons a dozen years ago used to be, and we thought not so long ago that they were never to return. I fancy that the owner of a big fleet, with ambition in the line of controlling the lake trade, is not always pleased with the situation that affords a big profit to his smaller competitors, as they are sometimes less tied up with contracts than he is and can then get the best of it. Too bad that the end of the season is so near. With three months of this there would be a return of the old satisfied feeling to the breast of the vessel owner who has for some reasons been wondering whether it is worth the while to keep up the fight for business.

Buffalo has apparently made too loud an outcry about the grain blockade, for it has now faded away so that it is reckoned that it will be a thing of the past this week and as the Canadian elevators are said to be as badly off as ours it follows that the all-rail routes are getting the business again, just as they have been doing all through the summer to a great extent. But for the canal, which is doing a very active business in grain in spite of the small size of its fleet, the port would have suffered very severely, for the railroads threw up the sponge as to taking care of the grain out of Buffalo much more completely than anywhere else or in any other trade, it seems, for though they have failed to move freight elsewhere much as they have here, they did not issue a statement, as they did here, declaring that it might cost a cent a bushel extra to ship grain here by lake, and thence east by rail.

The fact that Canada is not able to take care of her own wheat is shown by the fact that such high freights are paid here from Fort William, which is just now the point that the fleet is eager to visit last for "lay-up" wheat to Buffalo. As usual the vessel owner was not willing to believe that freights would go up as they have and took a lot of Canadian wheat at what is now a low rate. A steamer that has 5-cent wheat chartered was in the other day with a cargo at four cents and must now go back for another taken at 2¾ cents before she can come into her best earning. A little more faith would have made a big difference in her earnings. But others are getting the big rates if she is not.

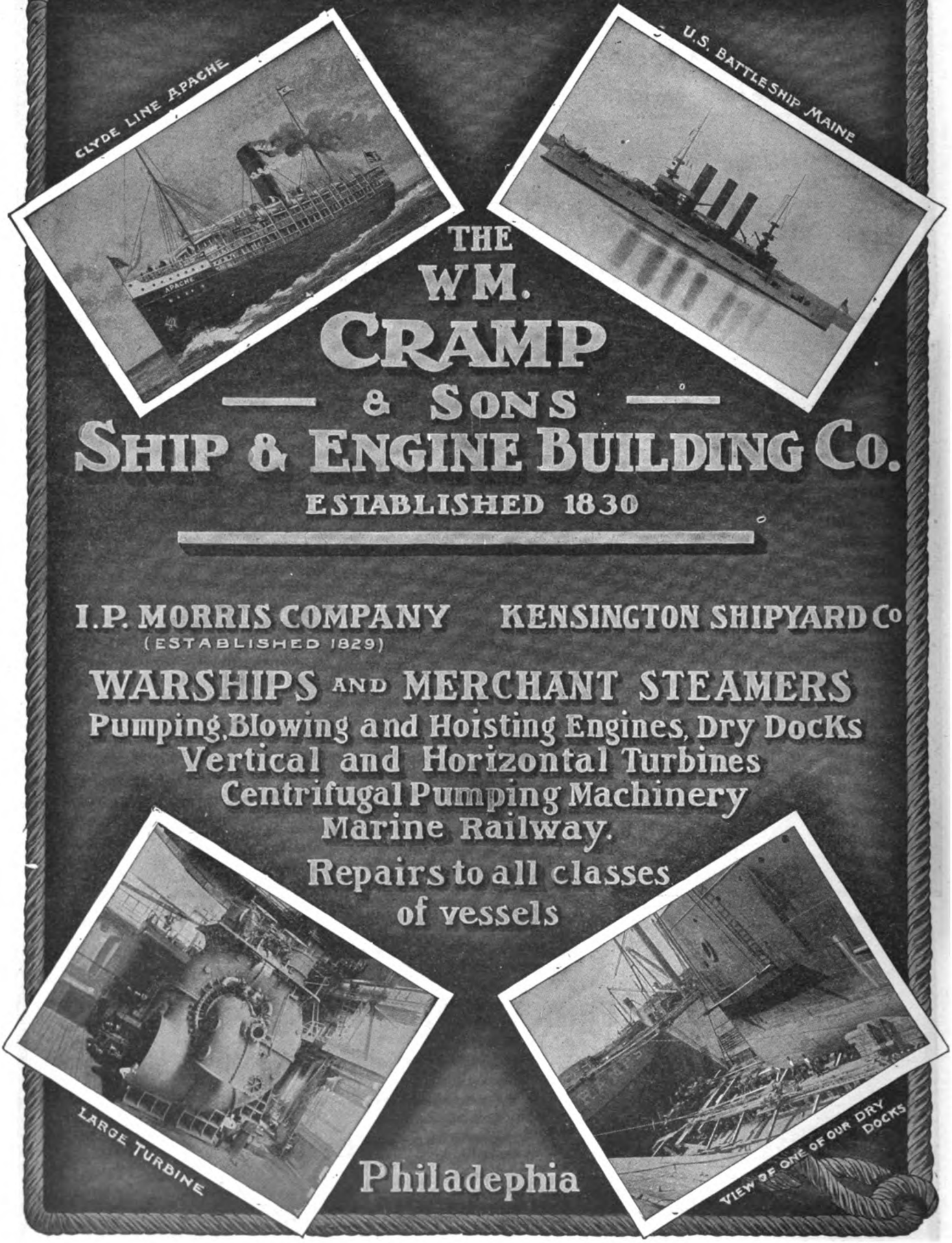
When a lake captain or outside vessel owner runs up against something here he does not fancy he has a pleasant way of saying that Buffalo harbor is out of date, but he may all the while be merely saying that we are outgrowing the railroad accommodations. One of the older steamers, the R. P. Fitzgerald, came in here at 5 p. m. one day last week with a cargo of 120,000 bu. of oats, took it out and was outside with a load of coal at 1 p. m. the next day. This is quite up to old times. At the same time a big steamer came in with no elevator to go to and waited several days to unload. One or two east-bound roads have no elevators they can really call their own and consignments over their lines sometimes suffer.

They are saying that the lumber fleet is not getting its full share of the good fall business. There have been a few charters made at $4.00 from Lake Superior, especially to Ohio ports, but as a rule all the lumber to come down to the Niagara river was taken some time ago and the high rates will catch only a few incautious shippers this fall. Then the barges are being held up more by the prevailing high winds this fall than the other boats are and lose much valuable time though they have been more lucky as a rule than their defenseless condition would lead one to expect and have not gone down by the dozen as they sometimes do in stormy falls.

Perhaps the most despondent part of the lake service now is the underwriter, who is pretty nearly handicapped by a season like this. With the big fleets more and more inclined to carry their own insurance and often much competition on cargoes, which, for instance, must have brought the premiums on coal so low that the losses on it have exceeded the receipts, it is hard to say what ought to be done to recover from this especially losing season. It is hard for an outsider to see why the marine companies did not seek to cut out the abuses they complain of in the days when they were in command of the situation. They were much more in position to forbid heavy loading then than now, which they claim is the reason for a great part of their losses this season.

And now comes the struggle in a few days to make place for the winter fleet, which will need to be large on account of the grain to be laid up afloat, and alas the poor harbor master! To work as he only has had to work in that office and then to face a change of city administration and a probable loss of position next year. It sounds like the wail of the poor farm hand that we used to hear—to work all summer and die in the fall!

VOL. XXXII. CLEVELAND, NOVEMBER 16, 1905. No. 20.



Buyers' Directory of the Marine Trade

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by The Marine Review, Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

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Mietz, Aug. .....New York.

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Fore River Ship & Engine Co..Quincy, Mass.
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Bowers, L. M. & Co.....Binghamton, N. Y.

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ARTIFICIAL DRAFT FOR BOILERS.
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Great Lakes Engineering Works.....Detroit
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Chicago Ship Building Co.....Chicago.
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Dearing Water Tube Boiler Co.....Detroit.
Detroit Ship Building Co.....Detroit.
East End Boiler Works.....Detroit.
Fletcher, W. A. & Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Works....
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Marine Iron Works.....Chicago.
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Cowing, John P.....Cleveland.
Scherzer Rolling Lift Bridge Co.....Chicago.

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Brown Hoisting & Conveying Machine Co.
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McMyler Mfg. Co.....Cleveland.

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Penton Publishing Co.....Cleveland.
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Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.

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Brown Hoisting Machinery Co. (Inc.)....
..... Cleveland.
McMyler Mfg. Co.....Cleveland.

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Lake Superior Contracting & Dredging Co.,
..... Duluth, Minn.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H..Milwaukee.
Sullivan, M.....Detroit.

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